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OCTOBER 1985 BRITAIN'S BIGGEST-SELLING HOM[E COMPU]TER MAGAZINE Vol.5 No.10



We spill the beans on Amstrad's 256K Word Champion

PLUS

Sinclair Spectrum 128

KEY IN TO MICRO MUSIC

CBM-64 Midnight Express and Smooth Scroll

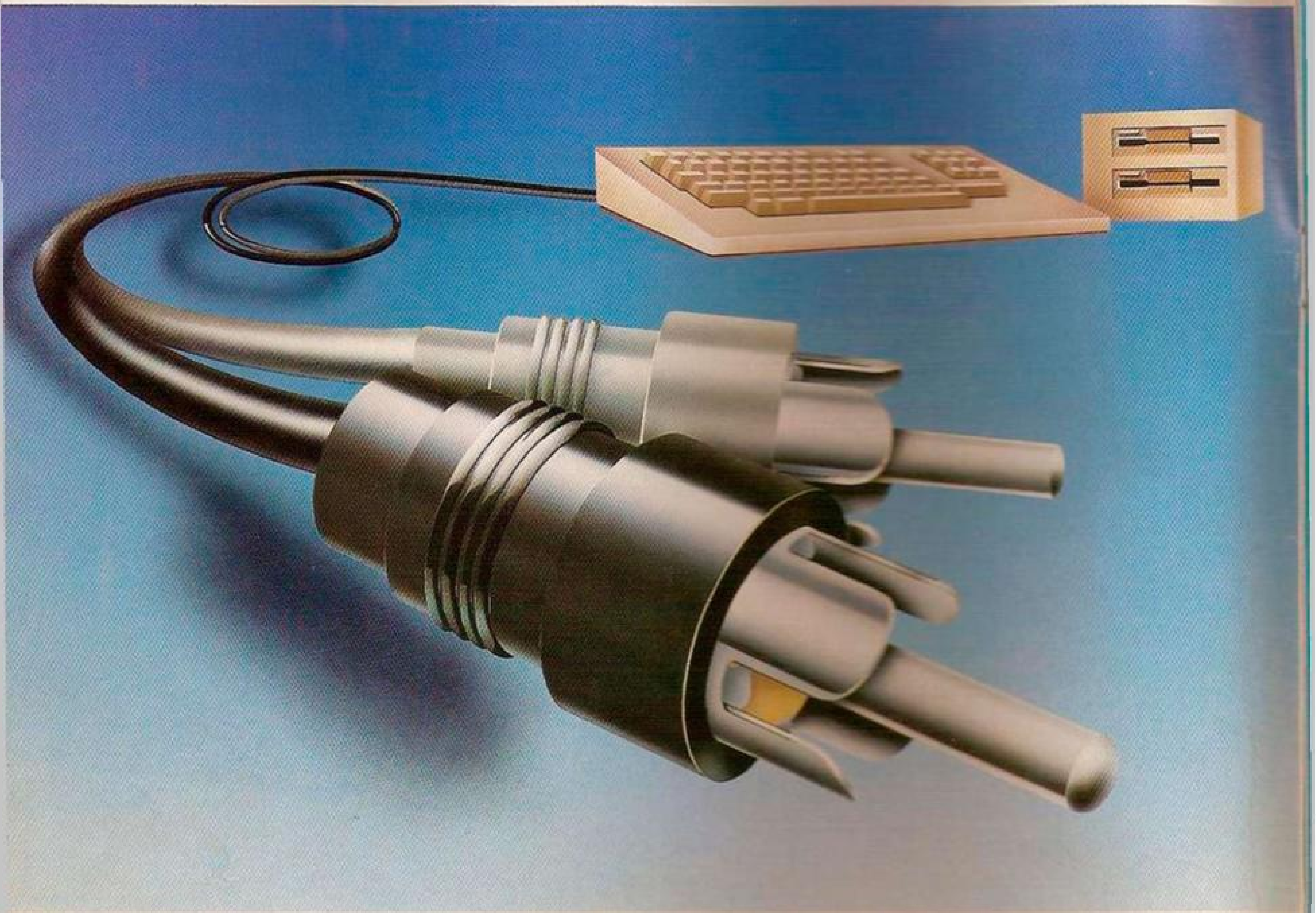
Spectrum Impulse and BBC Pikchachanja

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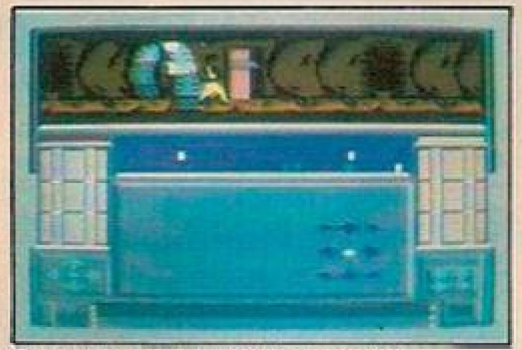
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Contents

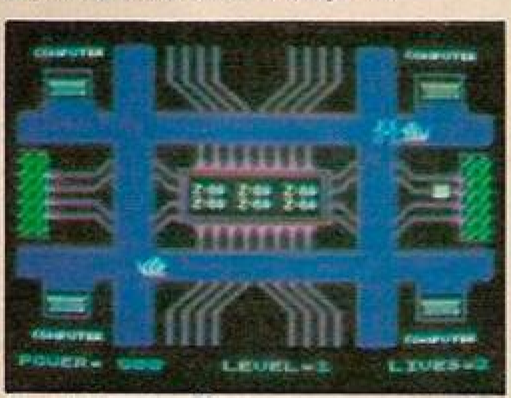
OCTOBER 1985



Music micro, please: page 38.



Beyond's supersecrets: page 44.



Impulse: page 56.



Melody master: page 60.



Cover story — we spill the beans on the new Amstrad: page 46.

It does accounts, projections,



No wonder people are racing out to buy Amstrad's new CPC 6128 computer.

Not only does it answer all your business needs, it's also compatible with nearly 200 arcade and adventure games. So it can either speed you through your income tax returns or whizz you round a simulated Silverstone.

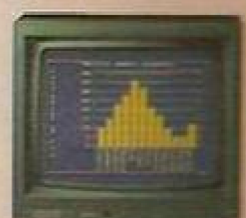


On the business side we start you off with a free disc which introduces you to the Amstrad CPC 6128's impressive range of capabilities, and the best ways to exploit them.



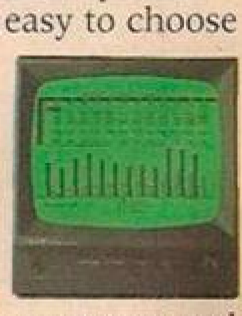
You'll discover how its massive 128k memory can open the door to over 8,000 CP/M* applications.

Programs like 'Wordprocessing' and 'Database' will file and index records, produce standard letters, mailing lists and even compile reports.



There's a series of business control programs which form a complete invoice, stock control and statement system.

In other words it's easy to choose the software you need to take the big problems out of your small business.



But even if you don't own a business there are plenty of good reasons for owning an Amstrad CPC 6128.

It makes short work of the problems we all face. Like keeping track of rates, mortgage and H.P. payments.

However even software packages as comprehensive

AVAILABLE AT BOOTS · BRIDGERS · CLYDESDALE · COMET · CURRYS · DIXONS · GRANADA · GREENS · LASKYS · JOHN LEWIS · RUMBELOWS ·

wordprocessing and 180mph.



as Amstrad's are only as good as the hardware they're loaded into.

You need a complete system.

That's why the Amstrad comes complete with a built-in disc drive as well as a monitor (green screen or full colour). So it's ready to go to work as soon as you get it home.

And if you want to go further additional disc drives, printers and joysticks are all available to ensure that your computer can grow with your growing needs.

Finally there's one feature of the Amstrad CPC 6128 that's both good business and a pleasure: the price.

With Green Screen around	£299
With Colour Monitor around	£399



Tell me more about the Amstrad CPC 6128

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Address____________________

Amstrad CPC 6128 with 128k memory

Who says business and pleasure don't mix?

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Amstrad owners start out happy, and get even happier as time goes on.

The first delightful discovery is that both the CPC 6128 and the CPC 464 are complete and ready to use as soon as you get them home.

The CPC 464 comes with built-in datacorder, and the CPC 6128 with built-in disc drive. And both have either a full colour monitor or a green screen.

But Amstrad owners can become even more attached to their computers with the simple addition of the peripherals featured here.

They'll make your Amstrad faster, harder working and more entertaining.

And they're very easy to attach. Simply plug in, and away you go, there's no need for extra interfaces.

You may of course wish to get into some even more serious computing, for which you will need the Amstrad RS 232C specialist interface. This opens the door to modems, networks, and serial printing.

But whichever additions to your Amstrad you care to make you'll find their low prices an additional pleasure.



YC/P/1

Tell me more about the Amstrad range of peripherals.

Name____________________

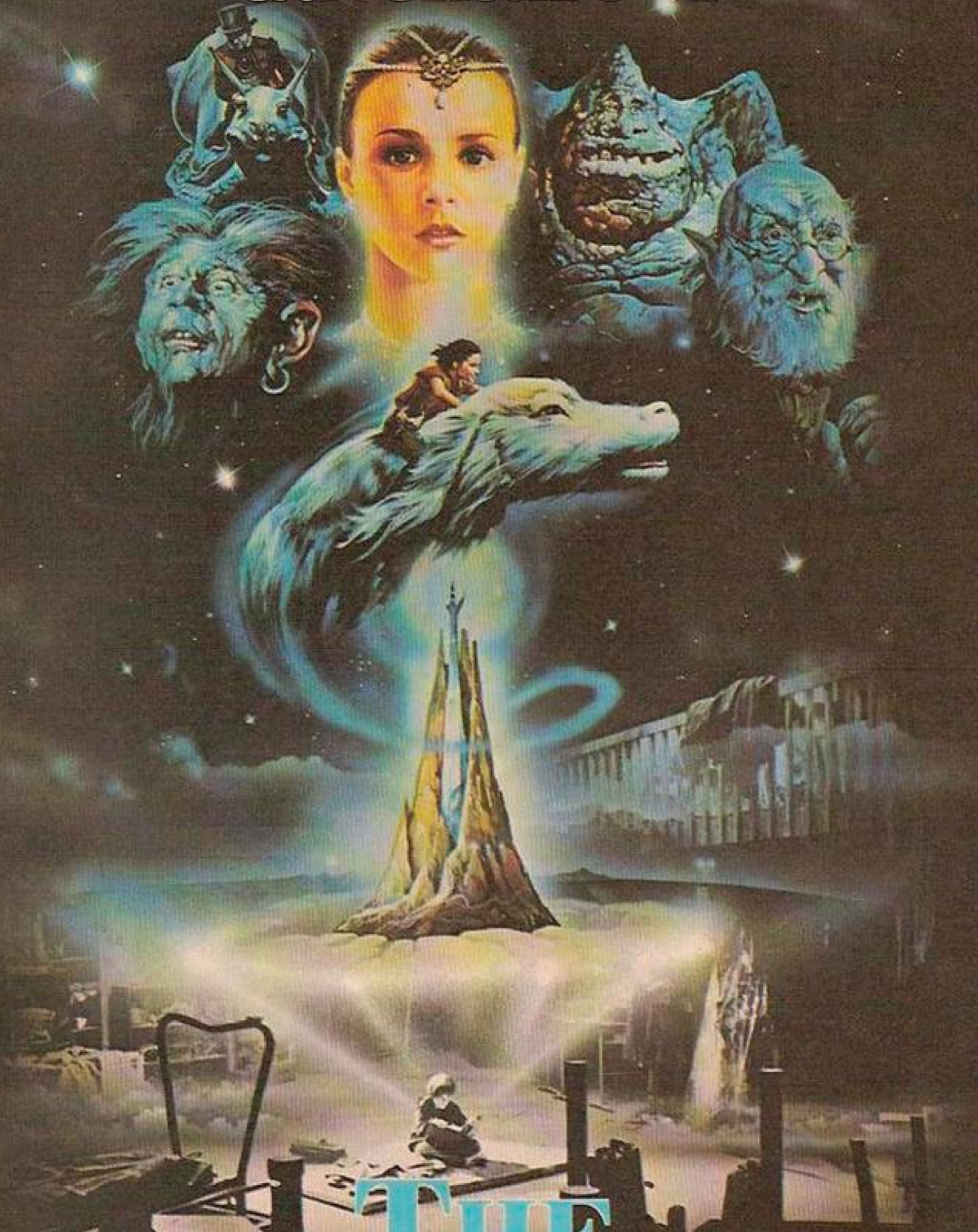
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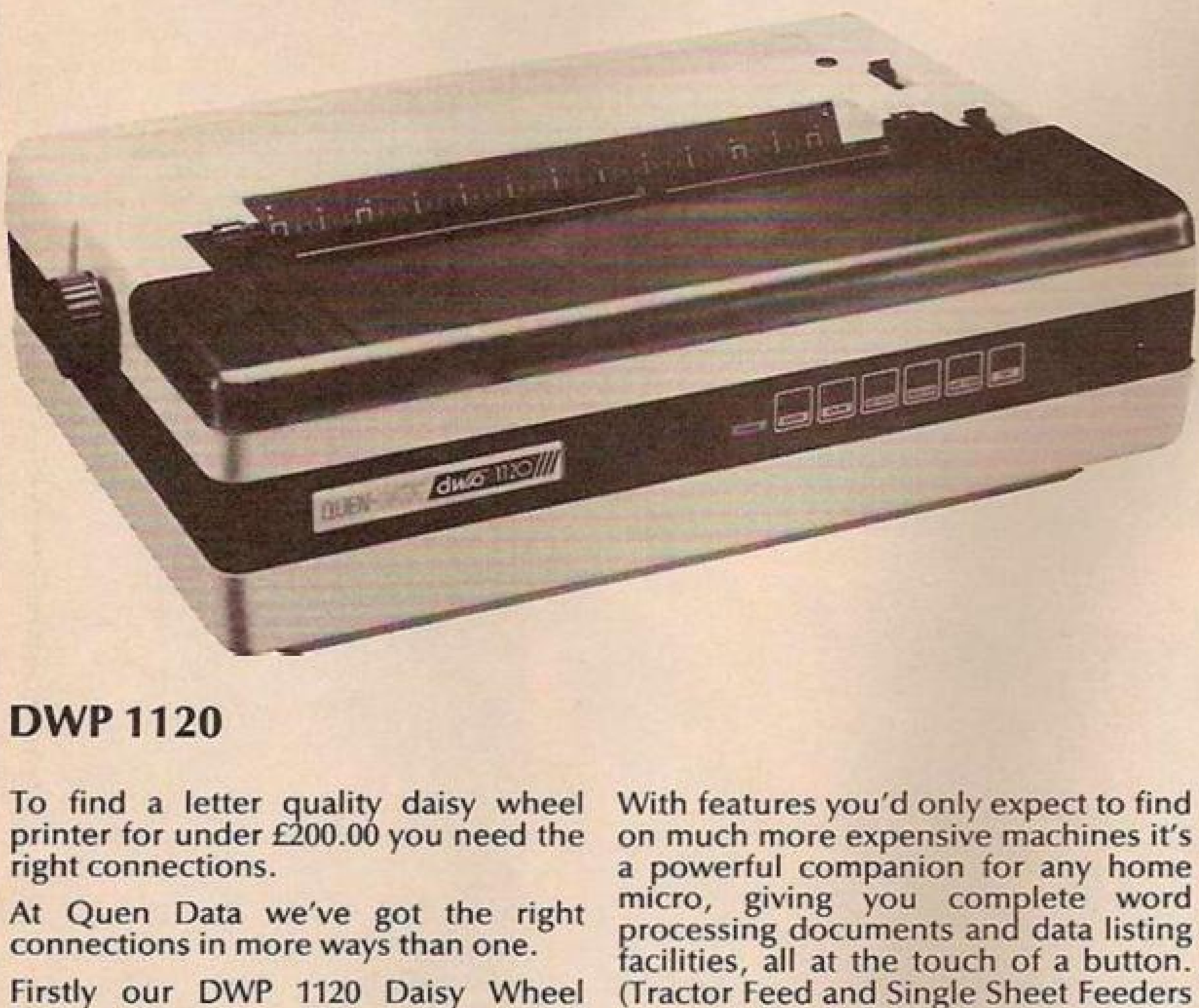
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TIME TO GET SERIOUS?

HALF-PRICE QLS and Amstrad's 8256 have knocked real word processing down to around the £400 mark. At last one of the major uses for a computer outside games and education has been opened up to the mass consumer market.

And suddenly everyone's clapping Amstrad boss Alan Sugar on the back for having the insight and for taking the risk in producing the first home computer dedicated to a single application.

Amstrad and Sinclair are obviously trying to sell us something — but they're also trying to tell us something: there are uses for home computer technology apart from games. To some extent that's being backed up by those software houses who have been producing high-quality packages that are serious, useful and fun — products like Oxford Computer Publishing's stunning Art Studio graphics program for the Spectrum.

It makes sense for software producers to spend time working on those kinds of packages. They will continue to sell steadily long after high-flying games have burnt out. Equally, the people who buy them will still find them value for money some time after even the most playable arcade adventure has become boring.

Of course games will be the meat and drink of the industry for a long time yet. But with QLs for £200 and the non-games software manufacturers creating serious products that rival the best games for quality, the whole home computer market will be based on a broader and more stable footing.

The real key to these changes is the Amstrad 8256. Up until now word processing may have appealed to a lot of us, but no one would have been prepared to lay out anything from £800 upwards for a facility that might only occasionally use. For £460 for 256K, monitor, disc drive, printer and CP/M Plus, the new Amstrad marks a real breakthrough — in price if not in technology.

If the 8256 were to fail as the QL at £400 did before it, home computing could be condemned to another term as an ailing entertainment industry.

Even after the disasters of 1985 the current mood is swinging towards optimism.

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Guy Taylor and Rainbow Hero at Fulham.

OVER THE RAINBOW

WE DON'T NEED another Hero — or perhaps we do. Maplin's Hero Jr was cunningly disguised as Rainbow, the design for a multi-purpose football crowd entertainer/controller which won Guy Taylor a real Hero in our design a robot competition. He was presented with it at Craven Cottage, but Rainbow may be more use at other London grounds if Arsenal and Spurs supporters come to blows over a couple of new computer football programs.

Charlie Nicholas is endorsing Rothmans Quick Football Quiz for the Spectrum, while Glen Hoddle is putting his name to a soccer game for the Amstrad. The football quiz sports 1,000 questions and up to four can play, with multiple-choice style questions.

Strad bashing

JAB WITH the left then hook with the right. Amstrad's combination punch of launching first the 6128 battering ram then the 8256 word champion (review page 46) has set the opposition reeling but when complaints come in from angry 664 owners Alan Sugar starts bobbing and weaving.

Just three months after launch the 664 is dead, leaving buyers wondering whether software houses will bother to bring out special mini-CP/M programs now that Amstrad is producing a full 128K model and refusing to offer a 128 upgrade for the 664. The 464 is now down to £199 or £299 with colour monitor.



Hurricane's Amstrad snooker.

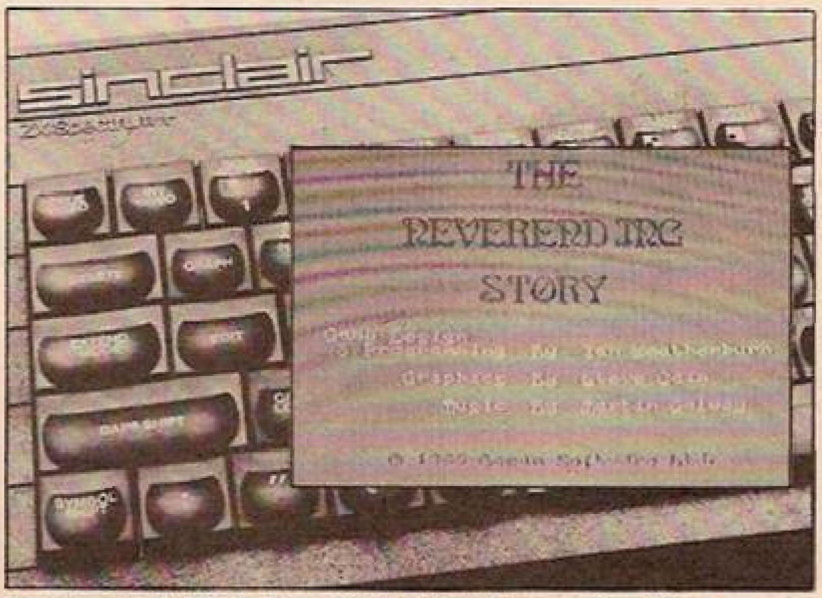
SINCLAIR 128

New Spectrum spotted

OUR SPIES have seen the 128K Spectrum Pluses which Sinclair has sent to a handful of top software houses in preparation for the launch which will happen as soon as the warehouses can be cleared of current stocks. The 128 will be bundled with a program specially written to take advantage of the extra memory — possibly Ocean's Neverending Story which is split into three for the 48K Spectrum but loads in one on the 128.

Prototypes consist of a Plus with an additional board hanging out the back and the 128 has twin Roms so that, like its Commodore rival, it can maintain compatability with existing software in Spectrum mode yet offer improved facilities in 128 mode. These include a better Basic, AY 38910 sound chip, and improved video display.

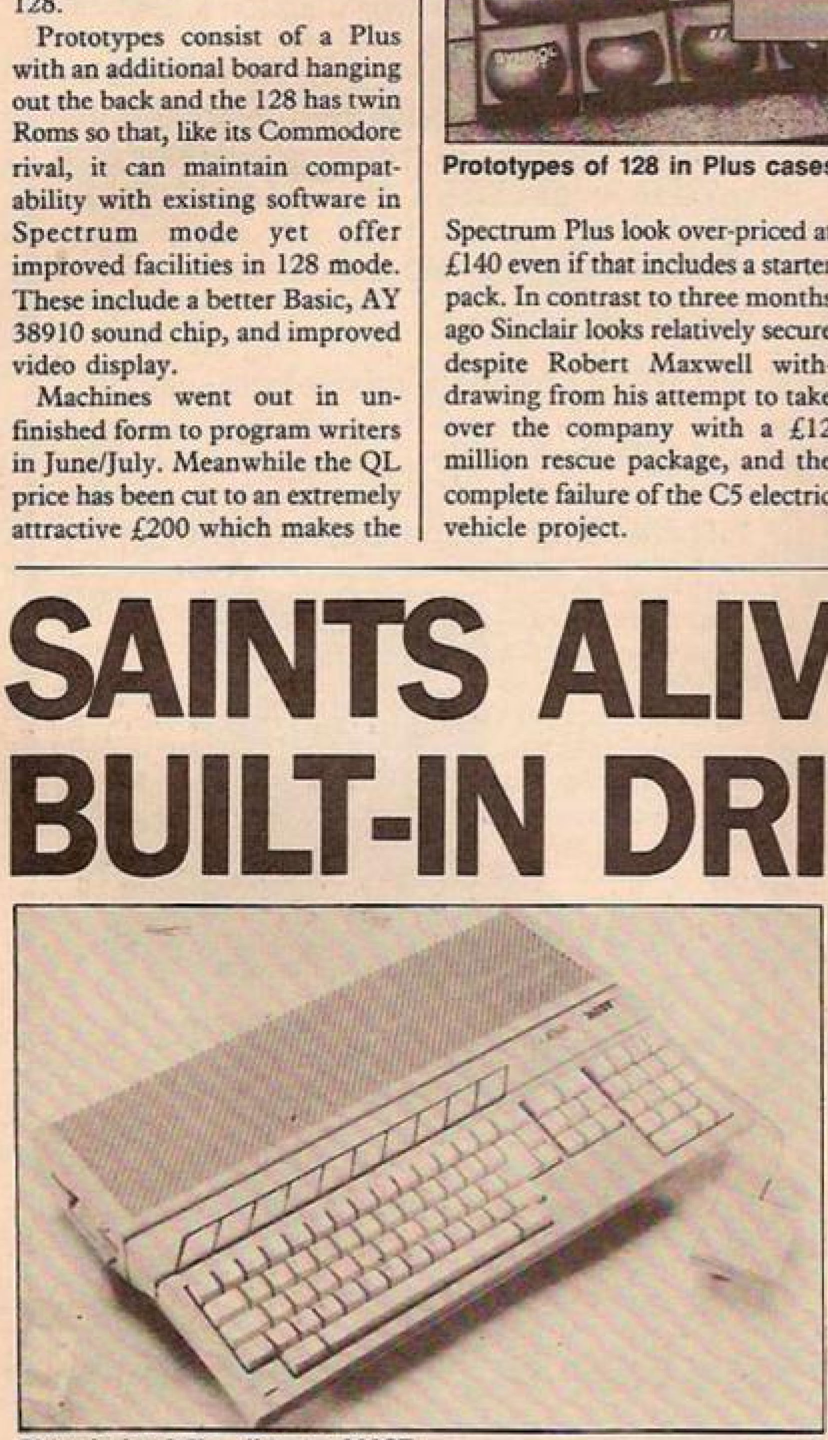
Machines went out in unfinished form to program writers in June/July. Meanwhile the QL price has been cut to an extremely attractive £200 which makes the Spectrum Plus look over-priced at £140 even if that includes a starter pack. In contrast to three months ago Sinclair looks relatively secure despite Robert Maxwell withdrawing from his attempt to take over the company with a £12 million rescue package, and the complete failure of the C5 electric vehicle project.



Prototypes of 128 in Plus cases. Inset Neverending Story.

Creditors have agreed not to pull the rug on Sir Clive this year which gives him a chance to raise cash through the Christmas sales boom and then release his three new products, the portable Pandora, 128 Spectrum and QL II. QL II will have 256 or 512K, and perhaps Psion software on Rom.

SAINTS ALIVE!—A BUILT-IN DRIVE



Sidewinder 3.5in. disc on 260ST.

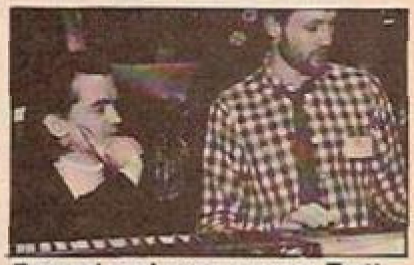
JACK TRAMIEL has sprung three surprises at the public launch of the ST in Britain at the PCW show. First the 260 ST "Little Saint" he showed has a built-in 3.5in. disc drive in the side of the keyboard which strongly supports the suggestion that it will eventually be sold with a mouse but without a monitor for around £500.

Second some of the STs on display turned out to have one megabyte of Ram on board — with talk of 4Mbyte monsters back home at Atari — and third, there really were 80 software packages up and running on the saints at launch.

These included the fabled Bandersnatch originally an Imagine project of the Spectrum which would have needed a plug-in hardware dongle, which turned into a QL project before emerging on the ST under the name of Brataccas from a company called Psygnosis.

At the same time Atari is threatening to cause chaos in the bargain basement by selling 64K 800XLs for £70 — including a joystick and game cartridge! Atari will also be selling the cheapest 128s at around £140 for a 130XE or £265 including a 1050 disc drive. £350 will buy you a 130XE based word processor with 1027 letter-quality printer and software.

64 music midi sampler + drums



Feargal and programmer Trott.

IS IT FEARGAL or is it Microvox? Feargal Sharkey becomes the first owner of the Microvox sound sampler from Supersoft. The Microvox, at £229.95 offers sampling rate up to 42kHz. You also get a Midi interface as well as pre-emphasis/de-emphasis circuitry and noise reduction.

The sound quality was very impressive, and you get a total of 2,000 notes to play with. If you need some drum backing, try to persuade any Spectrum owning friends into parting with £29.95 for a SpecDrum unit from Cheetah marketing.

Last chance for Oric owners

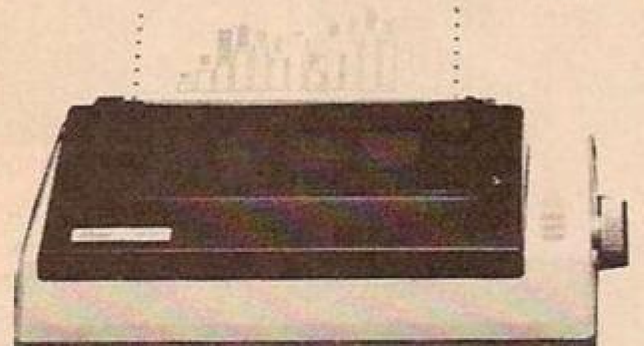
ONE LAST AVENUE of hope for owners of broken Orics may have been opened up by Computer Services. The company is covering the new year-long guarantee offered with a £130 bundled deal of Atmos, data recorder, Quickshot II joystick, interface and software being put together by Dudley Langmead Enterprises. You could try contacting Computer Services for a quote on repairing your old Oric, even though you didn't buy it under the new deal.

Ace trove in Cambridge

AN ISOLATED colony of the long-extinct Jupiter Ace has been discovered in the centre of Cambridge. The small group of the Forth-based computers nesting in Boldfield's showrooms are going for £35 a time. Adopt one on 0223-61175.

OPEN SUNDAYS 10 - 1

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DIARY

JUST TEN DAYS after a mysterious package arrived in the office with a label saying "warning live hamsters" — it turned out to be the CPC-8256 (continued page 47) — Ocean supremo David Ward tells us that he is prepared to eat a hamster to get on a Your Computer cover.

LITTLE BIRD on a No. 9 bus back in June sees a freckly, wiry lad in running shorts trying to dodge the conductor. Freckles goes up to a plump jovial old bluffer wearing an Oxford United rosette and says "We're old mates, wot about a loan, enough to get me to Christmas". "Love to but if I did that I wouldn't have enough to buy a paper" says bluffer. "OK" says freckles. "How about you pretend to bail me out and give me some nice free publicity in your comic and then when the heat's off you can pull out quietly — if I can get to August no-one will pull the rug on me then till next year." "But what's in it for me" says bluffer. "Simple, you can save the British computer industry — people will love you."

MIND YOU — same little bird also claims that Robert Maxwell visited the PCW show incognito — dressed as Donald Duck and that Sir Clive did his £100 million What If . . . calculations during the crisis using a QL running Decision Maker.

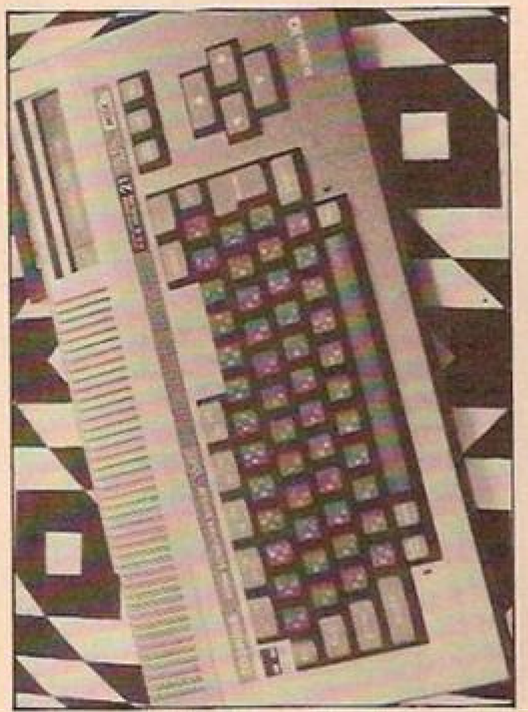
MSX WORTHIES Chris Greet and Georgie Gibbs worked till midnight to get their stand ready for PCW. Tired but triumphant Chris returned to his hotel to find that the computer had re-allocated his room and there wasn't even any room in the stable. Meanwhile Georgie was scampering back to her apartment for a quick blast of space invaders only to find that a burglar had swiped her telly — and the only other thing missing was a four foot yucca plant. Police are searching for Percy Thrower.

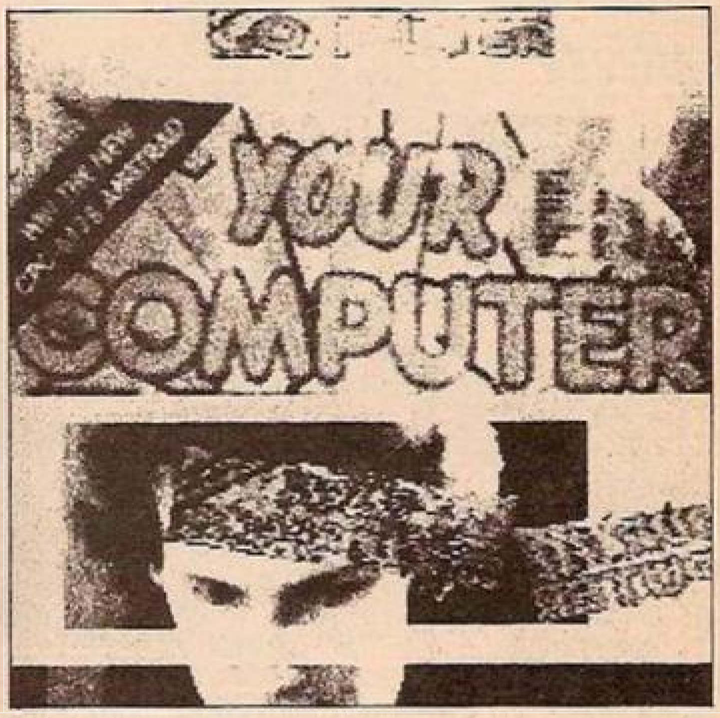
ALSO AT the show, an Imagine reunion. While Colin Stokes paced the Ocean stand Hetherington and Lawson were just out of spitting range, fortunately, at Atari showing off Bandersnatch — sorry Brataccas. Above them all on the balcony stand stood Bruce Everiss shouting "Fight, fight".

Elsie Dee

BIG IN JAPAN

Europe's Eureka rivals MSX





MSX-Toshiba HX23 and Mitsubishi amazing video mix.

JUST AS MSX seems to be getting its act together European governments are teaming up to set up a rival European standard for home electronics. Under the Eureka programme — nothing to do with Elite or Oric — Britain's Department of Trade and Industry is proposing a Eurohome project including "the early development of common European standards" for "home information and entertainment, domestic appliances and associated control systems".

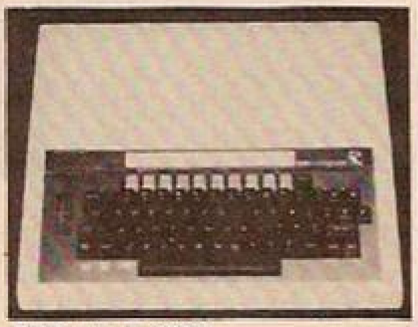
MSX spokesman Mike Margolis is not worried that companies like GEC and Philips — which at the moment is producing MSX micros might be working on rival Eureka projects "it's very encouraging" he says "that people are beginning to copy MSX".

Mitsubishi, Sony, Toshiba and JVC are all emphasising their continuing commitment to MSX. Toshiba is cutting the price of its existing HX-10 to £100 which is also the new price for the Korean GoldStar MSX but Toshiba is also showing the new MSX 2 specification HX-23 which has 80 column display, 512 × 212 resolution up to 256 colours 128K video Ram and a battery backed calendar clock. Mitsubishi is demonstrating a frame grabber which can superimpose MSX 2 graphics over a TV or video picture with professional effects.

Meanwhile Kay Nishi of Microsoft ASCII in Japan which pushed MSX says ASCII is concentrating on Large Scale Integration and VLSi to produce an MSX engine which will be CMos for low power consumption — hence MSX portables in future, with three other chips.

128 POWER FOR BBC B+

ACORN'S NEW 128K BBC Micro is an admission that the B+ has been a disaster. High street stores including WH Smith have given up trying to sell BBCs, so the £499 BBC 128, the price Acorn tried to charge for 64K just a few months ago may be too little and too late to save the company. Dealers will be encouraged to upgrade any Pluses to 128K. Meanwhile, Oak Personal Computers is trying to corner the market in designer Acorns with BBC systems dressed up to look like business machines — not, despite the name, made out of wood like the original Commodore Pets.



BBC up to 128K.

An hour a day keeps doctor away

TENSE, NERVOUS? Blame the computer says Prem Misra, a Glasgow doctor who is warning parents not to let children play with micros for more than one hour a day.

Memories going cheap

HOW MUCH does 64K of Ram cost these days? About £4 since Matsushita has cut the cost of its 64K bit Ram chips to 50p compared with £2 a year ago.

THOUGHTS & CROSSES

37 MARKET STREET, HECKMONDWIKE, WEST YORKS

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View Driver Gen	Acornsoft	
Viewsheet (rom)	Acornsoft	
White Knight II	BBCSoft	
Acorn Viewstore	Acornsoft	
Accounts Payable	Acornsoft	
Interwheel	Comp Concepts	
View	Acornsoft	
Diaries	Clares	
Creative Sound	Beebugsoft	
Discmaster (disk)	Beebugsoft	
Dumpmaster (disk)	Beebugsoft	
Exmon	Beebugsoft	
Help (rom)	Beebugsoft	
Hershey Font (disk)	Beebugsoft	
Murom (rom)	Beebugsoft	
Paintbox	Beebugsoft	
Paintbox	Beebugsoft	
Sleuth (rom)	Beebugsoft	
Spellcheck II (rom)	Beebugsoft	
Sprite Utilities	Beebugsoft	
Sprite Utilities	Beebugsoft	
Starter Pack	Beebugsoft	
Teletext Pack	Beebugsoft	
Teletext Pack (disk)	Beebugsoft	
Caretaker (rom)	Comp Concepts	
Disk doctor (rom)	Comp Concepts	
Graphics (rom)	Comp Concepts	
Gremlin (rom)	Comp Concepts	
Printmaster (rom)	Comp Concepts	
Wordwise (rom)	Comp Concepts	
Beta-BAse (disk)	Clares	
Grafdek (disk)	Clares	
Grafixy	Clares	
Replica II (disk)	Clares	
The Key (disk)	Clares	
Mini Office	Database	
Cashbook Accounts	Gemini	
Database	Gemini	
Final Accounts	Gemini	
Home Accounts	Gemini	
Invoices & Statements	Gemini	
Mailist	Gemini	
Payroll	Gemini	
Stock Control	Gemini	
Word Processor	Gemini	
Beginner's Assembler	Honeyfold	
Beginner's Basic	Honeyfold	
Editor Printout Library	Island Logic	
Synthesizer Keyboard Library	Island Logic	
The Music System (disk)	Island Logic	
Basic Ext (rom)	Micropower	
Machine Code Tutor	New Gen	
VU-Calc	Psion	
VU-File	Psion	
Ed-Master	R. H. Electronics	
Light Pen Graphics	R. H. Electronics	
View Driver Gen (disk)	Acorn	
Wordwise Plus (rom)	Comp Concepts	
Ultracalc 2	BBC	

SPECTRUM

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Masterfile	Campbell	
Masterfile & MF Print	Campbell	
Astronomer	CP Software	
Extending Basic	CP Software	
Floating Point Forth	CP Software	
Supercode II	CP Software	
Supercode III	CP Software	
Lamerdo	Creative	
Money Manager	Creative	
Mini Office	Database	
The Illustrator	Gilsoft	
The Quill	Gilsoft	
C Compiler	Hisoft	
Dev Pac 3	Hisoft	
Pascal	Hisoft	
Ultrakit	Hisoft	
Purchase Ledger	Kemp	
Sales ledger	Kemp	
Stock Control	Kemp	
Melbourne Draw	Melbourne	
Omnicalc 2	Microsphere	
Machine Code Tutor	New Generation	
Lightmagic	New Generation	
Machine Lighting	Oasis	
Spec Mac Mon	Oasis	
White Lightning	Oasis	
Address Manager Standard	OCP	
Address Manager Plus 80	OCP	
Editor Assembler	OCP	
Finance Manager Standard	OCP	
Finance Manager Plus 80	OCP	
Machine Code Test Tool	OCP	
Stock Manager Standard	OCP	
Stock Manager Plus 80	OCP	
VAT Manager Standard	OCP	
VAT Manager Plus 80	OCP	£17.95
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Tasprint	Tasman	£8.90
Taswide	Tasman	£4.95
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EXPORT ORDERS WELCOME

UPDATE

It's weird how computer shows come too early or too late for software houses.

Quicksilva is following up the success of the Rupert game with a Rupert II — no truth in the rumour that Sylvester Stallone wants the film rights. Also sheltering under the Argus Software banner is Mindgames with the new adventure Evil Crown.

After the success of Spitfire 40, Mirrorsoft is following through with a Harrier flight simulator, natch, with tanks, SAM sites and Mig-23s to shoot at. Cold war mentality aside, the game is billed as more than just a flight simulator. Apart from all that viffing and stuff you can do in a V/STOL jet, obviously you have to take certain strategic decisions about where to strike all this enemy hardware. The game features a head-up display as well as the standard cockpit display. Your mission is to destroy the enemy HQ.

Also new from Mirrorsoft is Fleet Street Editor — no Robert Maxwell jokes, please — a powerful package which apparently enables you to produce your own newspapers, newsleters and notices. Perhaps Mr Maxwell would be interested after all. Available on two discs for the BBC Micro in December you can produce, blow up, and modify pictures — more sophisticated versions for the the Atari ST and Commodore Amiga are aimed at the professional market, says Mirrorsoft.

Shoot-'em-ups are back in fashion. This is the word on the street, we are assured by Hewson Consultants still puffing contentedly away with their recent Brighton Belle steam-engine simulator. Confronting the space-age, they have made the third part of the Dragontorc trilogy a space adventure. Astro-Clone features the same problem-solving graphics as medieval Avalon and Dragontorc but, in this one, it's clones versus Seiddab wariors. You're never alone with a clone and these guys can actually reach for a weapon, turn and fire it and return it to its holster — a big step forward in animation for author Steve Turner.

RAMBO RUNS

Strife on the Ocean wave

"WHAT MOST people call hell he calls home." And this Christmas you too will be able to share the living hell of Rambo as the US Army Special Forces renegade fights his way back through the green hell of the Vietnamese jungle with rescued American POWs supposedly held by Vietnam since the hasty US retreat a decade ago.

It's only a movie, and whatever the reality of the situation is, Ocean Software has had to work hard to develop a game as action-packed as the film, in which some unfortunate dies every 2.1 minutes. Ocean programmer Bill Barna compares the game under development to an old arcade favourite called Commando, but stresses the greater complexity and sophistication of the Ocean product. "Rambo can move in all directions, not just from side to side, and there is a problem-solving adventure element to the game."

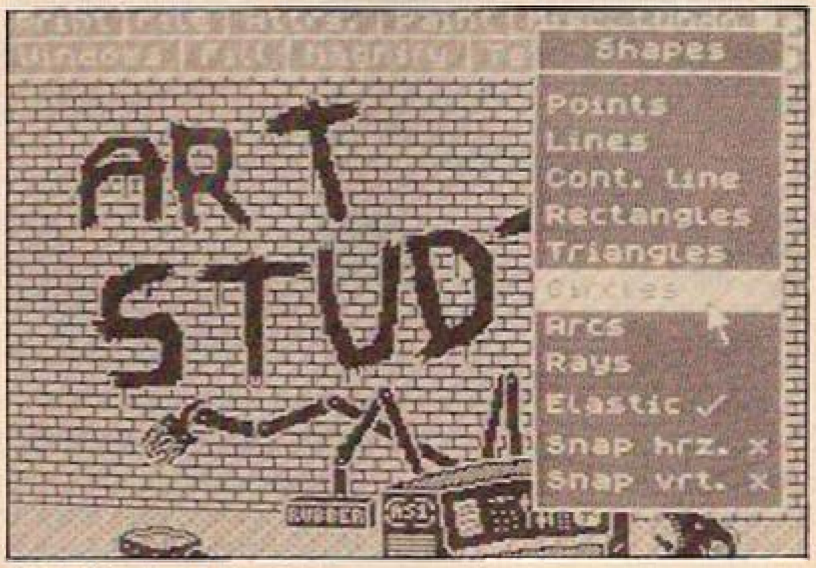


"But if we go to Vietnam who will look after the house plants?"

The gung-ho muscleman is given a bow and arrow by someone he meets in the jungle just like in the movie — no bow and arrow and he'll be forced to backtrack later in the game.

There is to be a flight simulator sequence in the game — could this turn out to be the first Russian helicopter simulator on sale this side of Samarkand?

COLOUR MAC SPECTRUM

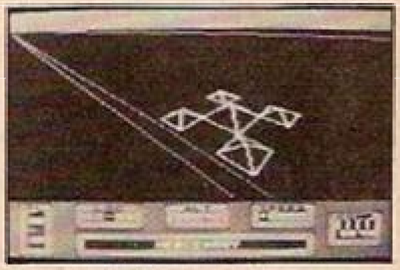


Not a Mac but a Spectrum.

WITH A MACINTOSH-like stroke of Art Studio's spraycan you can find out what Paul Daniels looks like without his toupee, or how Churchill's wartime credibility would have fared if he's sported a Hercule Poirot moustache.

Art Studio is an impressive Spectrum graphics package from Oxford Computer Publishing. The £12.95 package has windows, icons, pull-down menus, and works from keyboard, joystick or with an AMX mouse. It's fast and takes the Spectrum the closest yet to the Macintosh's graphics.

Mercenary— The Targs of war



Novagen's Mercenary

CBM-64 AND ATARI owners can now crash-land their crippled spacecraft on the war-torn planet Targ. After 18 months' development, Novagen's paul Woakes has finished mercenary — Escape from Targ, and Spectrum and Amstrad versions should be out in November.

At £9.95 you can play Mercenary as an Adventure — the underground sequences alone have 170 rooms — or as a complicated shoot-'em-up, taking lucrative jobs from both sides in the Palyar-mechanoid civil war. Woakes is already talking about mercenary II with a March blast-off date.

POP★ TOPS

TOP 20

1	Hyper Sports	Imagine	Sp/64
2	Frank Bruno's Boxing	Elite	Sp
3	Cylu	Firebird	Sp/64
4	The Way of the Exploding Fist	Melbourne House	Sp, 64 & Am
5	Frankie goes to Hollywood	Ocean	Sp/64
6	Desert Burner	Sparklers	Sp
7	Booty	Firebird	Sp/64
8	Graham Gooch's Test Cricket	Audiogenic	64
9	Don't Buy This	Firebird	Sp
10	Hyway Encounter	Vortex	Sp
11	Cauldon	Palace	Sp/64
12	Arnhem	CCS	Sp
13	Nodes of Yesod	Odin	Sp/64
14	Dambusters	US Gold	Sp/64
15	Red Arrows	Database	Sp
16	The Fourth Protocol	Hutchinson	Sp/64
17	Softaid	Etheopia Appeal	Sp/64
18	Pitstop II	US Gold	64
19	Southern Belle	Hewson	Sp
20	Bobby Charlton's Soccer	Holiday Bros	El/Bc

Sp=Spectrum 64=CBM 64
Am=Amstrad El=Electron Bc=BBC
Source = WH Smiths.

TOP 3 BY MACHINE

1	Rockman	Mastertronic	Vc
2	Doodlebug	Mastertronic	Vc
3	Hunchback II	Ocean	Vc
1	Way of Exploding First	Melbourne House	64
2	Frankie goes to Hollywood	Ocean	64
3	Action Biker	Mastertronic	64
1	Frank Bruno's Boxing	Elite	Sp
2	Roland Rat Race	Ocean	Sp
3	Dambusters	US Gold	Sp
1	Repton	Superior	El
2	The Hackers	Firebird	El
3	Overdrive	Superior	El
1	Way of the Exploding Fist	Melbourne House	Am
2	Locomotion	Mastertronic	Am
3	Non Terraqueous	Activision	Am
1	Finders Keepers	Mastertronic	Ms
2	Chiller	Mastertronic	Ms
3	Pitfall II	Mastertronic	Ms
1	Revs	Acorn	Bc
2	Wizardore	Imagine	Bc
3	Nightlore	Ultimate	Bc
1	One on One	Ariolasoft	At
2	Pole Position	US Gold	At
3	Airwulf	Elite	At
1	Formula 1 Simulator	Mastertronic	16
2	Airwulf	Elite	16
3	BMX Racers	Mastertronic	16

Vc = Vic 20 64 = CBM 64
Sp = Spectrum Bc = BBC At = Atari
16 = CBM 16 El = Electron
Am = Amstrad Ms = MSX.
Source = Websters Software.

Write to: Your Letters, Your Computer, Room L221, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Our Prestel mailbox number is 019991800.

YOUR *letters*

Dear Uncle Clive,



Your recent treatment by the media would have been very trying for most people. But then you're not most people. The British press love the smell of failure, especially when it's one of Maggie's blue-eyed boys. But this won't have bothered you. You have intellectual authority, a superior piece of clockwork between your ears. With courage in your convictions criticism is like water off a duck's back. This, after all is your greatest strength — and weakness.

The early boom days of this industry were ideal for you. You innovated. The MK 14, ZX-80, 81 and Spectrum fed an insatiable demand. Your mistakes, and there were many, were forgiven or forgotten in the mad impetus of the marketplace. Things are different now. The big boys have arrived, you have real competition, your mistakes show. And how. Robert Maxwell and Dixons have between them contrived to give you breathing space. I am going to be cheeky and suggest what you do with this reprieve.

Firstly don't launch your new range, Pandora, 128K Spectrum and QL Mk 2 until they are properly engineered, well made, reliable and available. You used to be able to get away with wobbly Ram packs, exploding power supplies and keyboards that wore out. Not anymore. The customer is educated now to expect and to get better. If you don't give them what they want Amstrad, Atari and the Japanese will.

Secondly, leave the silly ideas to other people. The city would be more confident, your customers happier and you more successful. The Microdrives are more trouble than they are worth — dirt cheap to make but prodigiously unreliable and universally disliked. Swallow your pride and go for proper discs. Wafer-scale integration, fourth generation and advanced batteries are all very nice but not really the business of a microcomputer manufacturer with limited resources. These projects are really just ego-massaging, you wouldn't catch Alan Sugar or Jack Tramiel playing round with them. So sell them off and buy in technology as and when you need it. It is what you have done in the past when you have been your most successful. As for the C5 and the research and development into future electric vehicles, sell it off. The project is too long term for you to afford. You have marketed it very badly, leaving egg on beard.

Thirdly be nicer to the rest of the industry. Without retailers, distributors, software houses and peripheral manufacturers your sales would have been small. You had a symbiotic relationship with all these people, but now you need them more than they need you. Three years ago they could only make a living by supporting Sinclair, now they can do very nicely without, thank you. This is why the QL has been such a failure. You must not launch new products mail-order only, creaming off the profit and delaying deliveries. Launch through the trade. Then customers get their product when they pay for it. The product gets support and distributors and retailers get a living. You must be nicer to software houses, otherwise they will write for other computers. Without lots of good software a computer is only useful as a paperweight.

I can only hope your future is as successful as your past and that you continue as a major force in the British microcomputer industry.

Yours sincerely,

Bruce Everiss

Bruce Everiss.

ROM SUBROUTINES

MACHINE CODE programmers may be interested in a few useful Basic Rom subroutines (JSR).

Check for the next Basic character:
$AEF7 — right bracket
$AEFA — left bracket
$AEFD — comma

Print string from lo-byte in accumulator, hi-byte in Y register and stop at first zero:

$AB1E

Get next 8 bit number from Basic into X register:

$B79R.

Get next 16 bit number from Basic into $14 and $15:

$AD8A then $B7F7

There are many other handy subroutines in the Basic Rom — I have used several in my Superbasic program published in this issue. By the way, if anyone can't face typing in all that data I can provide Superbasic on tape or disc for £4 and £6 respectively. Write to Coles Bungalow, Privett, Alton, Hampshire, GU34 3PH.

R A Mason, Alton, Hampshire.

MICRONET 800

CONGRATULATIONS TO Mr Houlton of St Helens who recently won a VTX 5000 modem in British Telecom's "1000 Modems" competition.

However, Mr Houlton's letter published in September's *Your Computer* was factually incorrect with regard to joining Micronet 800 and could mislead *Your Computer* readers who are considering going "on-line".

The facts are as follows:

- Subscribing to Micronet 800 and Prestel costs just £16.50 per quarter. This is *NOT* subject to VAT.
- Using a modem to access any on-line service will inevitably incur telephone charges. Micronet 800 is the only home computer network which gives users nationwide access at especially low phone rates — ie only 40p per hour after 6pm and all weekend. Without this facility the unwary modem user may find that regularly accessing even free bulletin boards can be an expensive pastime.
- Mr Houlton's preference for "try before you buy" is rightly shared by most micro users. With this in mind,

(continued on page 21)

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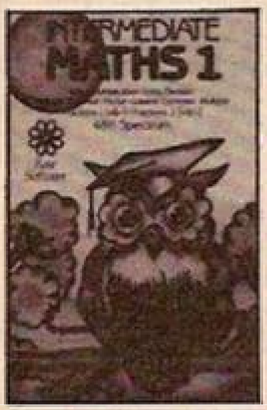
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BETA BASIC 3.0

SPECTRUM 48K

SINCLAIR USER, JAN. 85 (ABOUT RELEASE 1.8): "HAS ESTABLISHED ITSELF AS THE STANDARD EXTENDED BASIC FOR THE SPECTRUM...TURNS SINCLAIR BASIC FROM A GOOD VERSION OF THE LANGUAGE TO A FANTASTIC ONE." NOW, WITH RELEASE 3.0, BETA BASIC BECOMES PROBABLY THE MOST POWERFUL BASIC AVAILABLE ON ANY 8-BIT MICRO!

- PROCEDURES - a terrific implementation that lets you extend your Basic! No PROC keyword is needed; e.g. you can use commands like: swop a,b or draw_box 10,20,5 or addup b( ),sum. With parameter passing by value or by reference (including arrays), LOCAL variables and recursion.
- Up to 128 WINDOWS with their own attributes and character size.
- ANY CHARACTER SIZE (giving from 1 to 64 or more chars/line!).
- LISTINGS with optional automatic indentation of loops, procedures, IF, etc. Works on existing Spectrum Basic programs too!
- KEYWORDS (including the Spectrum Basic ones) can all be entered by typing them in full, or by the "single entry" method, or both in the same line.
- A full range of TOOLKIT commands. • EXCEPTIONAL ARRAY and STRING handling.
- Many powerful GRAPHICS commands. • EXCELLENT EDITOR - fast an d convenient.
- MICRODRIVE commands are improved and much easier to use.
- OTHER FEATURES, new or improved, are too many to fully list! DO - LOOP structure with WHILE, UNTIL and EXIT IF; ALTER, AUTO, BREAK, CLEAR, CLOCK, CONTROL CODES, DEF KEY, DPOKE, DRAW TO, EDIT, ELSE , FILL, GET, JOIN, KEYIN, multi-LET, LIST a slicer, LIST DATA, ON, ON ERROR, OVER 2, POKE strings, POP, READ LINE, REF, ROLL, SCROLL, SPLIT, TRACE, USING. Faster GOTOs, GOSUBs and FOR-NEXT loops.
- 26 POWERFUL FUNCTIONS: AND, OR, XOR, DEC, HEX$, BIN$; fast SINE, COSE, RNDM; CHAR$, NUMBER, DPEEK, EOF, FILLED, INARRAY, INSTRING, ITEM, LENGTH, MEMORY$, MEM, MOD, SCRN$, SHIFT$, STRING$, TIME$, USING$.
- Spectrum Basic compatible - you can run existing programs. Transferable to Microdrive. Wafadrive and other special versions available.
- Comprehensive A5-size manual. More than 80 pages, packed with examples.
- To show you the power of Beta Basic's excellent procedures, we include on each tape a FREE TURTLE GRAPHICS package!
- Upgrades to Release 1.8 customers: If you bought direct from us, there is no need to return your cassette - just quote the (approximate) original purchase date with your order; otherwise return your cassette and name your supplier. The upgrade price of £6.95 (£7.50 overseas) includes a new manual. Release 1.8 remains available, at a reduced price of £8.95 (£9.50 overseas).
- TRANSFORM your Spectrum with BETA BASIC 3.0 for just £14.95 inclusive! (£15.50 overseas). Or if you want to know more about the program, send us an S.A.E.

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[ ] MORE INFORMATION ON ________. I HAVE/DO NOT HAVE RELEASE 1.8 ALREADY. A STAMPED ADDRESSED ENVELOPE IS ENCLOSED.

BETA SOFT

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IN ★ TOUCH

How to write for *Your Computer*

We called this magazine *Your Computer* precisely because we welcome your views, tips and hints and even your criticisms of machines and software in general. Here's how you go about getting your name into print. Your article should be typed, double-spaced, on A4 paper. A name and address on each sheet would help. Don't forget to tell us which machine it runs on. With programs please include a cassette or disc and some indication of how long it is. Please put what machine it's for on the envelope. Don't forget full instructions to us how to load and list your program and how to enter it for the readers.

The article must be submitted exclusively to *Your Computer*. We pay £35 per published page — that's as it appears in the magazine and includes illustrations.

Telsoft

Telsoft is *Your Computer's* software downloading service. Any program for the Spectrum or the BBC — and soon the Commodore — which has a telephone symbol next to it is available on the service. Both 1200 and 300 baud speeds are catered for. For more details call Colchester (0206) 8068. No more lonely nights typing in endless pages of hex digits.

Message service

You can get messages to us in two ways. Either use the Prestel Telex Link to 892084 BISPRES G or you can use our very own modem, day or night on 01-661 8978. The modem is V21, 300 baud, even parity, 10 bits per character. You simply transmit in upper case "YRC" — our address code, and wait for the acceptance code "+ + + STF GO". Then off you go. Don't forget to tell us who it's for. Sign off with "NNNN" — again in upper case.

YOUR Letters

(continued from page 19)

we provide a force of around 300 retailers across the UK to demonstrate the Micronet 800 service. Mr Houlton has a choice of two local retailers in St Helens — Microman Computers and Boots (Church St). Alternatively any modem user can access the free Micronet demonstration database using the 444 444 4444 identity and the 4444 password.

All Micronet advertising and sales literature clearly specifies both the subscription price and the low cost phone rates, and our national retailer list appears very frequently in the home computer press.

With modems rapidly becoming one of the most popular home computer peripherals, we would not like to see anyone deterred from going on-line and unable to enjoy the huge range of facilities available.

Ian Rock,
Marketing Manager,
Micronet 800.

A MIRACLE?

IN SPRING '84 I bought a Beta Disk controller for one of my numerous Spectrums. My decision was based on the fact that it was designed to work with any Shugart compatible drive, even with my BASF 6238 which consists of two drives (1 MByte each) and a single half height chassis.

Unfortunately I had to send it back, because it did not work. Although the manual clearly excludes guarantee outside the U.K., Technology Research Ltd. repaired it free of charge. After that the interface worked satisfactorily for more than a year. When I decided to upgrade to the double density version, it kicked the bucket — at the most unfavourable moment, since I merely needed it for copying my single density files onto double density diskettes before superannuating it. So I sent it back.

Lo and behold, after two weeks the black magic box was back, repaired for £30; a new one would cost some £100. I found out very soon that it was not really repaired. Believe it or not: Except for the case it is completely new, and several (minor) bugs of the original version have been removed, you remember: for £30 instead of £100.

To my mind the department of Technology Research Ltd. deserves mention in Britain's biggest selling home computer magazine. Readers' columns in British computer magazines are full of complaints about the black sheep in the computer industry; I sometimes get the impression that this flock is mainly black. Now here is at least one white sheep. You ask me, how I managed to make double density copies of my single density files? Ever heard of Uncle Clive and the network facility of his Interface 1? Try to do the same job on an IBM...

Hans Joerg Rothenberger,
Walenstadt,
Switzerland.

MORE ON MIRA

SOME OF your readers may have encountered some difficulty with Mike Rains otherwise excellent MIRA program, giving Microdrive owners a random access facility — September issue, p60.

In particular, the use of the Restore # command may cause a computer 'lock up'. The reason for this is that the extended Basic commands were written for an Interface 1 with Issue 1 Rom.

The following Pokes, entered either as an additional line 200 in the Basic loader — listing 2 — or as a series of direct commands to patch the code subsequently, will ammend the routines to operate correctly.

```
POKE 63111,142 : POKE 63112,19 :
POKE 63365,50 : POKE 63366,21 :
POKE 63375,133 : POKE 63376,31 :
POKE 63381,50 : POKE 63382,21 :
POKE 63390,11 : POKE 63391,31 :
POKE 63396,50 : POKE 63397,21
```

Des O'Hare,
Glasgow.

Mike Singleton, author of 'The Lords of Midnight' and 'Doomdark's Revenge', would like it to be known that the game called 'Snakes' which we published last month was, in fact, a copy of a game he wrote two years ago, released by Postern under the name of 'Snakepit'. He says that, at the time, it was one of his favourites and that it's a sign of how rapidly games software has developed that what was once a commercially viable game (even shown on BBC 1) now seems almost prehistorically simple. Bear in mind, he adds, that the game was originally developed for the 3.5K Vic — most games these days wouldn't even get their title screen onto so few bytes. Though it lacks the variety now expected of commercial games software, Mike still thinks Snakepit has addictive qualities.

THEM GOOD 'OL BOYS FROM TEXAS

HAVING JUST read Colin Grant's QL is OK letter in your September issue, I would like to point out to him that the QL was not the pioneer 16-bit micro he claims it to be. Far from it! Texas Instruments released their TI-99/4 home computer in 1979! This used the TMS9900 16-bit CPU, but was restricted by the use of an 8-bit data bus. The QL's first debugged appearance came in mid-1984, 5 years after the release of the 99/4!

This makes the claims by Mr Grant that the rest of the industry have followed in the QL's footsteps highly dubious. Both the 99/4, and its later model, the 99/4A, took much more slick than the QL! Complaints about the location of the on/off switch, size of the power supply, and the design of cassette cable abounded, resulting in poor sales and TI's resultant withdrawal from the market.

As for Sinclair being 'brave' to release a 16-bit machine on the market, I reckon the credit should go to Texas, who pioneered, yet paid the price of criticism for their advanced machines, which were way head of their time, in terms of design, Basic, and expandability.

It appears to me that Sinclair gets too much credit for the development of the micro market, where other companies, such as Atari and TI, receive bad reviews.

Stephen Meadows,
Nutley,
Sussex.



HARDWARE hitlist

ADD-ON EXTRA

Beta Interface

Disc Interface
Spectrum
£95.00

Technology Research has modified its Beat interface to include a magic button which, rather like Interface III, takes a memory image and dumps it to disc, allowing you to back-up protected tape sofware to disc. The interface itself was reviewed in January and Technology Research are on 0784 63547.

Starter Pack

Disc Drive
Various
£149 plus

Starter packs consists of interfaces, drives and software. Together with simple instructions on setting up, it's an easy way for a beginner to buy a disc system "off the shelf".

Multi port

RS232 interfaces
Amstrad
£99.95

This consists of the 8251 UART giving various baud rates at correct RS-232 voltages. There is also a 24-pin port, compatible with the BBC user port, and two Rom slots. One Rom slot is reserved for the SYKYCOM Rom which contains Prestel software. Skywave claim that this Rom contains downloading software compatible with a new service to be announced by Micronet.

The user port will allow modems such as the Miracle Modem to be interfaced with the Amstrad and use the software control features. Skywave Software are on 0202 302385.

Eprom burner

C64
£54.95

Burn your own Roms with this board for the C64. It will take 128K Roms. However, if you want to use the Roms you've burnt, you'll need the Rom mothermoards as well which costs £34.95 for the 128K version or £12.95 for 8K. The Rom burner and the motherboards are both available from Lightwave Leisure on 051 639 5050.

Turbo

- *Commodore 64/128*
- *Robocom Ltd.*
- *£24.95 plus*

THIS IS an entire cottage industry devoted to correcting the perceived shortcomings of the C64. This latest offering takes the form of a range of cartridges from the humble Turbo 10 to the Turbo 50 at £39.95. The Turbo 50 offers a Basic toolkit, disc and cassette commands, a machine code monitor, a reset switch and Centronics software.

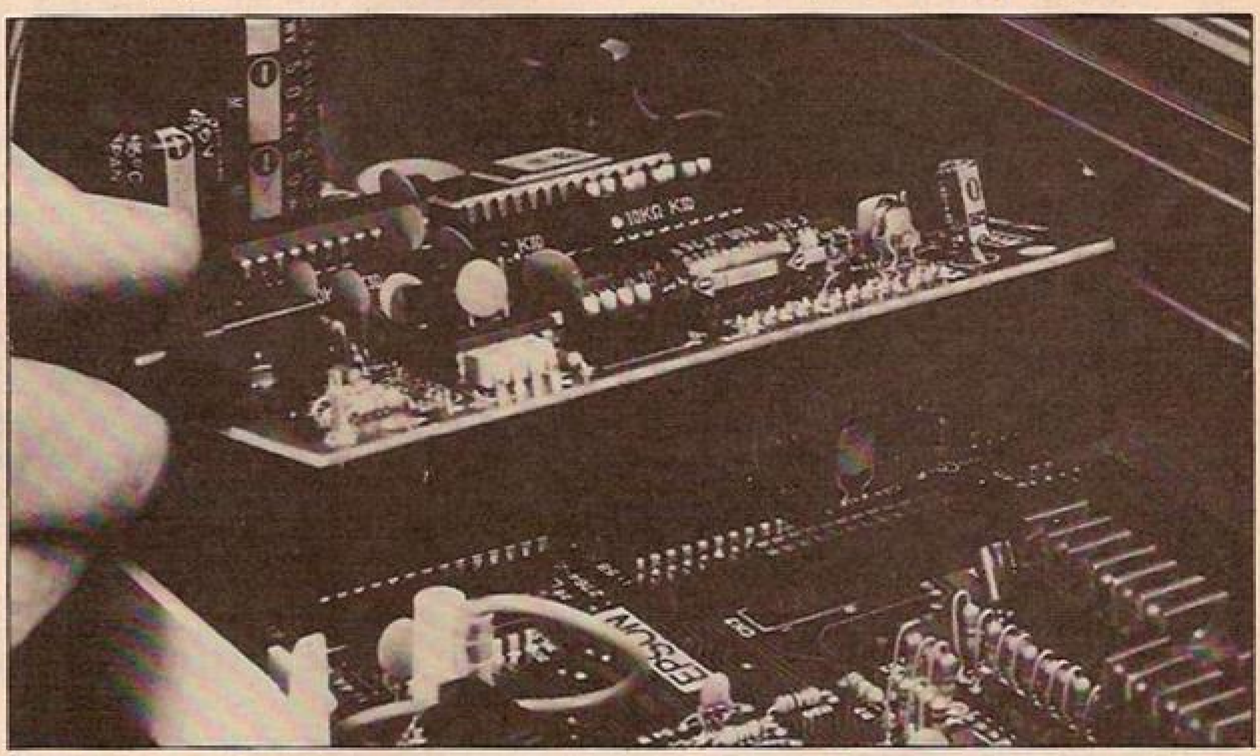
The Basic toolkit does not attempt to be a new Simon's Basic — there are no sprite or Sound commands — it just gives a couple of dozen commands which will be useful for programmers, block deletes, block lists, renumbers and so on. The disc and tape commands seek to speed up storage and abbreviate the DOS commands.

Tape loading and saving is 10 times faster, disc operations five times faster. Merge and copy commands are included. The printer handler can drive a Centronics printer, and program listings have colour and graphics characters "decoded".

The machine code monitor is very comprehensive. It occupies 4K and can be relocated as desired. It has an assembler, disassembler, breakpoints, single stepping, relocating with conversion of all absolute jumps. There is also a reset switch which, together with the old command, should allow recovery of a Basic program after a crash.

The cartridge takes up no Basic Ram and the small area it occupies — from COOO to CFFF — can be freed using the Quit command.

The various other members of the Turbo family trade off price for facilities and it's up to the customer which functions he wants to buy. Good value packages.



Epson NLQ Board

- *Epson Printers*
- *Epson*
- *£130*

THE RECENT introduction of high quality dot matrix typefaces from Cannon and Star has breathed new life into the established world of dot matrix printers. A little slow off the blocks, Epson have now entered the Near Letter Quality (NLQ) lists. The NLQ board can be fitted to your FX or RX printers, or comes built-in to the new LX80 and FX80+.

The NLQ font is produced by making two passes of the printhead slightly offset, producing an effective 18 pin head width. There are pica and elite print widths and, in proportional print mode, there is a sans serif NLQ font. This is particularly useful for producing clear super and subscripts.

Italic versions of both fonts are also provided. What you gain in quality, you lose in speed. Being uni-directional, and taking two passes, its about a quarter of the speed of normal draft mode printing. All normal draft modes are available with the board fitted.

The board also gives the printer some extra formatting commands. The printhead can be given a new position, in character dots relative to either the left margin or the present head position.

You can also produce extra dots between letters. This ability with some clever software would allow

New plug-in Epson near-letter-quality (NLQ) print boards up-rate FX and FX+ series printers.

true right justification of columns of text. Instead of the present rather primitive method of putting in extra spaces, you could add an extra dot to some of the letters, which would be hardly noticeable.

There is a 6K buffer. However, if all of this is available for printing, characters cannot be downloaded. An alternative configuration gives a 2K printer buffer and 128 definable characters. This add-on is a must for business users, although the hobbiest might feel it is a shade expensive. The new printers at £255 for the LX80 certainly look very good value. It looks like Epson are back on top in the performance/cost contest.

MSX · TATUNG EINSTEIN · ZX SPECTRUM · SINCLAIR QL · AMSTRAD CPC 464 & 664

Thinking software?

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TASWORD TWO (Spectrum)

64 characters per line on the screen!

"Without doubt, the best utility I have reviewed for the Spectrum."
HOME COMPUTING WEEKLY APRIL 1984

"If you have been looking for a word processor, then look no further."
CRASH JUNE 1984

The cassette program is supplied with instructions for microdrive conversion.

TASWORD TWO* ZX 48K Spectrum — cassette **£13.90**, microdrive cartridge **£15.40**

TASWORD EINSTEIN

A sixty-four character per line display and the ability to hold over five hundred lines of text at any time are just some of the features of this, the most recent of the Taswords. Full interaction with the disc system — e.g. Tasword detects the presence of added drives and allows their use.

TASWORD EINSTEIN Tatung Einstein — disc **£19·95**

TASWORD MSX

With all the features of the Spectrum Tasword Two including the amazing sixty four character per line display. The Tasword MSX machine code program utilises the 32K of memory not normally available to Basic allowing over five hundred lines of text to be held in memory.

TASWORD MSX* 64K MSX Computers
Fully inclusive mail order price **£13·90**
(cassette includes both disc and tape versions)

TASWORD 464

"There is no better justification for buying a 464 than this program."
POPULAR COMPUTING WEEKLY NOVEMBER 1984

A particularly sophisticated yet easy to use program. Now available on disc. The cassette version is supplied with instructions for transferring to disc.

TASWORD 464* Amstrad CPC 464 & 664 — cassette **£19·95**, disc **£22·95**

TASWORD 464-D

This is the new Tasword especially developed to utilise the capabilities of the CPC 464 and 664 disc drives. A major new feature is a powerful mail merge facility. Tasword 464-D will only run on, and is only supplied on, disc. ▷

TASWORD 464-D Amstrad CPC 464 & 664 — disc **£24·95**

THE TASPRINT STYLE WRITERS

A must for dot-matrix printer owners! Print your program output and listings in a choice of five impressive print styles. The Tasprints utilise the graphics capabilities of dot matrix printers to form, with a double pass of the printhead, output in a range of five fonts varying from the futuristic Data-Run to the hand writing simulation of Palace Script. A TASPRINT gives your output originality and style! The TASPRINTS drive all Epson compatible eight pin dot-matrix printers, e.g.

	NEC PC-8023B-N	BROTHER HR5
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EPSON RX-80	STAR DMP 501/515	DATAC PANTHER
EPSON MX-80 TYPE III	COSMOS-80	DATAC PANTHER II

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DATA-RUN → A FUTURISTIC SCRIPT
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MEDIAN - a serious business-like script
PALACE SCRIPT - a distinctive flowing font

Typical Tasprint output. Please note that different makes of printer produce different sized output.

TASPRINT (Spectrum)

Drives all the printer interfaces compatible with TASWORD TWO and can be used to print TASWORD TWO text files as well as output from your own Basic programs.

TASPRINT 48K Spectrum — cassette **£9·90**, microdrive cartridge **£11·40**

TASPRINT EINSTEIN

Print TASWORD EINSTEIN text files in one or more of the TASPRINT fonts.

TASPRINT EINSTEIN — disc **£14·95**

TASPRINT QL

TASPRINT QL includes a screen editor used to modify files created by other commercial software, such as QUILL, or by the user from BASIC. These modified files include TASPRINT control characters and may be printed, using TASPRINT, in one or more of the unique TASPRINT fonts.

TASPRINT QL Sinclair QL — microdrive cartridge **£19·95**

TASPRINT 464

Can be used to print AMSWORD/TASWORD 464 text files in addition to output from your own Basic programs. Drives the **Amstrad DMP-1** in addition to the printers listed above.

TASPRINT 464 Amstrad CPC 464 & 664 — cassette **£9·90**, disc **£12·90**

TASWORD UPGRADES

Tasword 464 and Amsword owners: send your original cassette or disc (not the packaging) as proof of purchase. Your original will be returned together with Tasword 464-D on disc. **£13·90**

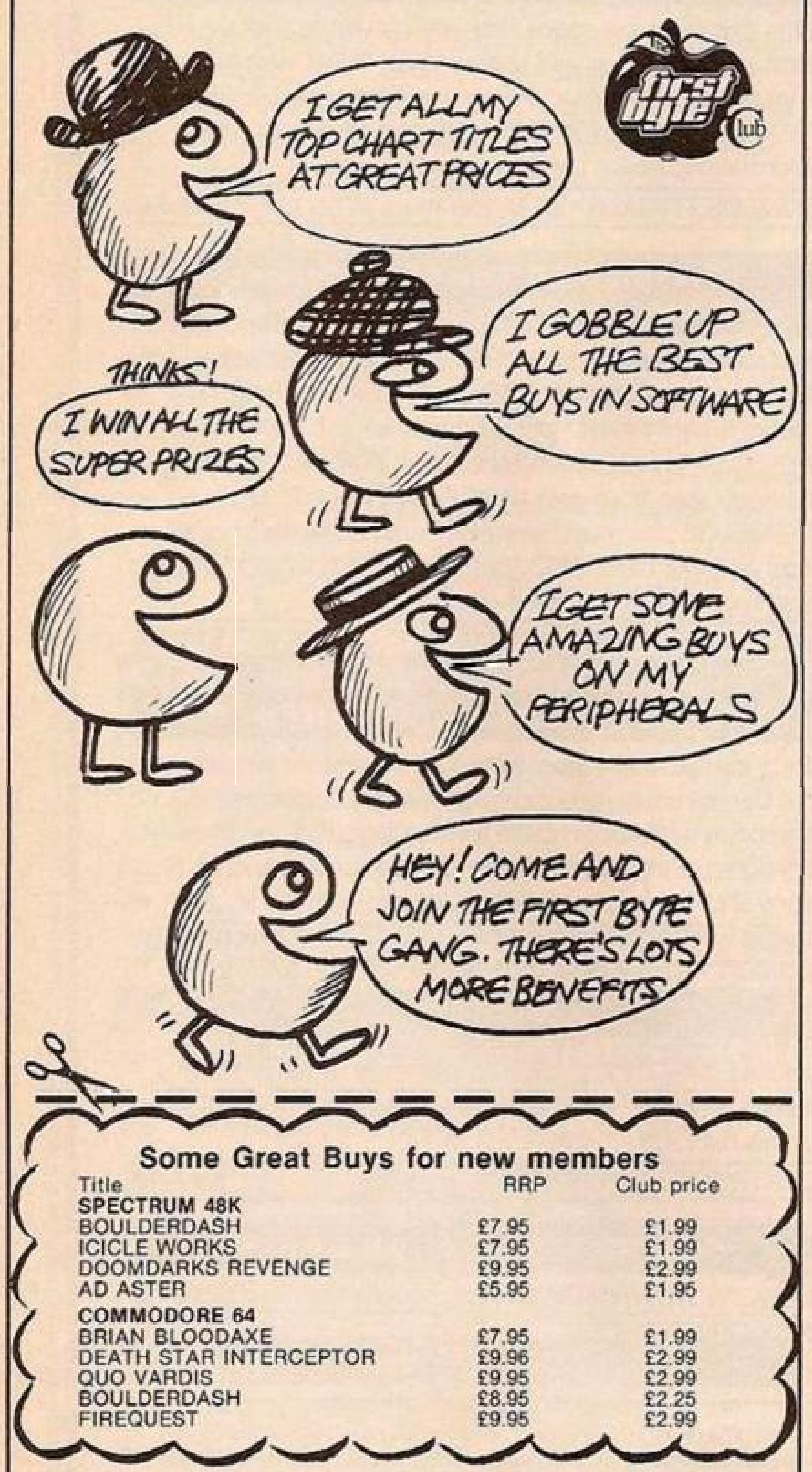
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COMMODORE 64		
BRIAN BLOODAXE	£7.95	£1.99
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Star★ chart

KEY

★★★★★ Best of its type
★★★★ Very good
★★★ Good
★★ Average
★ Below par

Talos

Spectrum
Silver Soft
Arcade adventure
£7.95

★★★

You get to put your giant war robot back together again, starting with a hand which rather amusingly crawls about the screen under your control. You can shoot at the various savage snails etc which assail you, but first find your arm. Once you've got this, you can assemble the rest of the robot body. Of course, the bigger you get, the more of a target you present. Having got yourself together, you must go and find the Crown of Eternity. Not wildly innovative as a game, but will appeal to compulsive puzzle-solvers.

Wizard and the Princess

CBM-64
All American Adventures
£14.95

★★★

This is the second All American adventure from US Gold at £9.95 on cassette and £14.95 on disc.

It's down to you to rescue the fair princess from the wizard Harlin, who is definitely not a nice guy. There is a fast graphic display from disc, but overall the game gives the impression of being rather less sophisticated than, say, the Hobbit.

The game syntax is traditional adventurespeak, which means you can spend a lot of time looking at snakes and scorpions without any constructive ideas as to what to do with them. The road to Harlin's castle is long and confusing — but that's what adventures are all about, isn't it?

SOFTWARE Shortlist

Goonies

- *CBM-64*
- *Platform game*
- *Datasoft*
- *£9.95, disc £14.95*

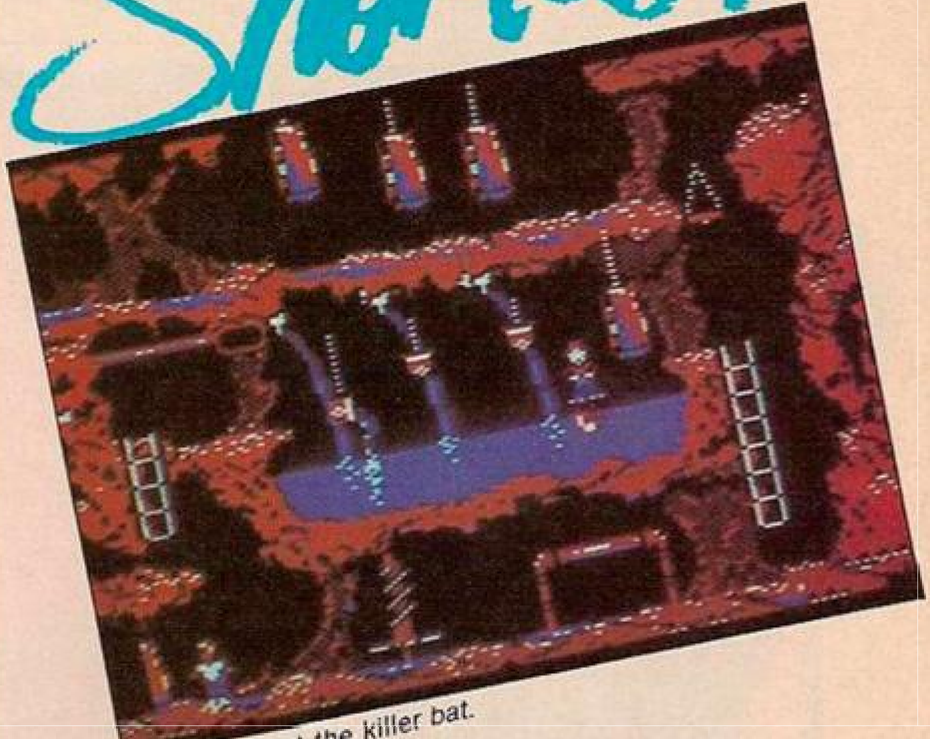
★★★★

MARSHMALLOW MAN scared you into making Ghostbusters into the smash-hit of 1984. Mama Fratelli and her awful gang aim to do the same in 1985. Goonies is more fun to play than Ghostbusters, even if Cyndi Lauper's soundtrack won't have you up and rapping round the house as it loads.

Stephen Spielberg's movie *Goonies,* on which the game is based, will be out this Christmas. When it was released in the States early in the summer it raced up the box-office charts although it never made it into the Ghostbusters blockbuster league.

The Goonies are a group of seven kids who have to evade the evil Fratelli gang and find their way to the treasure of One-Eyed Willy the pirate. Behind this bland-sound ing plot lies one of the most complicated platform games you're ever likely to meet. It requires so much concentration that Datasoft opted to give you eight lives after extensive testing in California showed that any fewer and you wouldn't stand a chance of getting through the eight screens intact.

You're in control of two of the Goonie band in each screen. Two can play the game as a team helping one another through a complex series of chambers and trapdoors to the next screen. Or you can play alone, switching control from Goonie to another with a touch of the fire-button.



Screen 2: Spot the killer bat.

The graphics are good and very smooth, and if the Cyndi Lauper numbers interfere with concentration you can always kill her off and just keep the usual game crunches and plops.

Mama Fratelli and her boys hang out in the lighthouse where the game action starts. This first screen is a doddle compared to what is to come. Rush Mikey up the lighthouse tower to the printing press which churns out greenbacks. Mama Fratelli can't resist picking them up, and while she's away from her post, Chunk can smash the water cooler into the fireplace to reveal the first secret passage.

Now you're into the caverns and time for your first meeting with the killer bats. After slipping under some dangerous boulders, and a bit of barrel rolling to collect the key you're through to screen 3 and its pipes of scalding steam.

I found this very tricky and rather tiresome, but getting through it is worth the effort — the cannonball runs in the next screen will blow a few fuses. I never made it past them but I can reveal that Goonie-eating birds, slime-spewing organ pipes and a vicious octopus await you.

... BEHIND THE SCREENS ... BEHIND THE SCREENS

SCOTT SPANBURG and the Goonies programming team hadn't even seen rushes of Spielberg's film when they started work on the game. They had to make do with the script and a belated visit to the set where the pirate galleon was being built.

As Scott was writing the early versions of the game, one of Datasoft's in-house artists Kelly Day was designing the graphics. As soon as they had decided on the basic look and feel of the game, three contract programmers were brought in to help — or translated into American blatherspeak "facilitated in the concept development".

Goonies took six months to write from beginning to end. Self-taught programmer Scott's biggest headache was to make the game as easy to translate from one computer to another as possible.



Cyndi Lauper: Girls just want to have fun.

To do it he created what came to be called the Spanburg Universe. It's a whole set of floors, cavern ceilings and walls that enable the game to play without any graphics interaction. That means the game can be switched easily to any other 6502-based system with only the graphics needing reworking.

But the real knack a programming team leader must have is to recognise a good concept — you can't afford to wait until the final programming to find out that it just doesn't play well.

The whole game and all its screens are based on Rube Goldberg-like cause and effect puzzles. He's the US equivalent of Heath Robinson, and his whacky drawings and inventions are well known to readers of *Mad* magazine.

What is Scott Spanburg's next project? No one at Datasoft seems to know. He's left the company and is apparently roaming the Mid-West.

Toby Wolpe

Star★chart

Toolbox 2

BBC
£9.95
BBC Soft
Utilities

★★★★

Even better than Toolbox 1, Ian Trackman's second tape provides a choice collection of 29 utilities, written in machine code. Pick of the bunch are a symbolic disassembler and a monitor which allows you to step through a program without corrupting the display.

Other items include sprite, scrolling and screen compactor routines. It is worth spending a further £10.95 on the book, which gives the source listings.

Out On A Limb

CBM-64
Anirog
Platform
£7.95

★★★

Good old platform games, where would we be without them. 23 screens with nice chunky graphics, as our hero, Jack, climbs the beanstalk to get the golden egg, harp and gold. As usual, timing of jumps is of the essence, and it is a process of working out the technique for each screen. A few bits of Anirog speech thrown in for good measure.

3D Munchy/ Hangman

BBC
Blue Ribbon
£2.50

★★★

Excellent graphics and price, shame about the lack of originality. The 3D version of Pac-Man has an interesting feature apart from the usual pill-munching and monster-eating. The four monsters also dig holes which can be filled in with shovels — of which there are three provided. As for Hangman — which again has a very attractive display — perhaps we should quote the instructions on this two-game pack: "Normal rules apply". Need we say more?

(continued from page 27)

Speed King

- *CBM-64*
- *Digital Integration*
- *Motorcycle racing*
- *£9.95*

★★★★

THE FIRST hairpin bend: lean into the corner, come off the gas, crash the gears down into fourth and pray you don't end up like Barry Sheene — a piece of human scaffolding.

This is a first-rate racing game from the company that brought you Fighter Pilot and Night Gunner. Race graphics are very good with a Pole Position-type view of the track.

The road ahead and the landscape beyond that scroll smoothly at different speeds, but that's the least you expect from any racing arcade game worth the name. What is really convincing is the way the bike and rider under your control lean into the bends. If this game sells well, the UK will soon be echoing to the crunch of Speed King players falling of their chairs as they succumb to the realism.

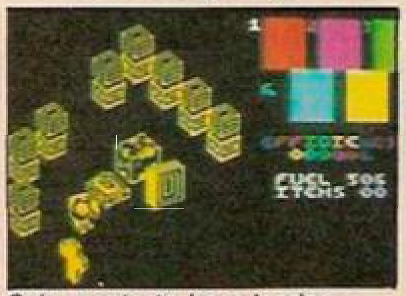
You won't have to spend hours learning the racing controls either. They're neatly logical whether you're using the keyboard or a joystick. Fire-button to accelerate, left and right to steer, forward to change down, and back to move up through the six gears to reach top speeds of around 250mph.

There is a catch, however. Your high-performance bike comes without any brakes. The only way to reduce speed quickly is to forget the accelerator and zoom down through the gears. The excellent sound effects scream out the high revs as you use the gearbox as a brake.

Whichever of the three levels you choose — novice, pro or champion — you always start off at the back of a field of 19 speed-crazed riders. The higher the level, the more likely they are to box you on the bends and send you crashing to the ground.

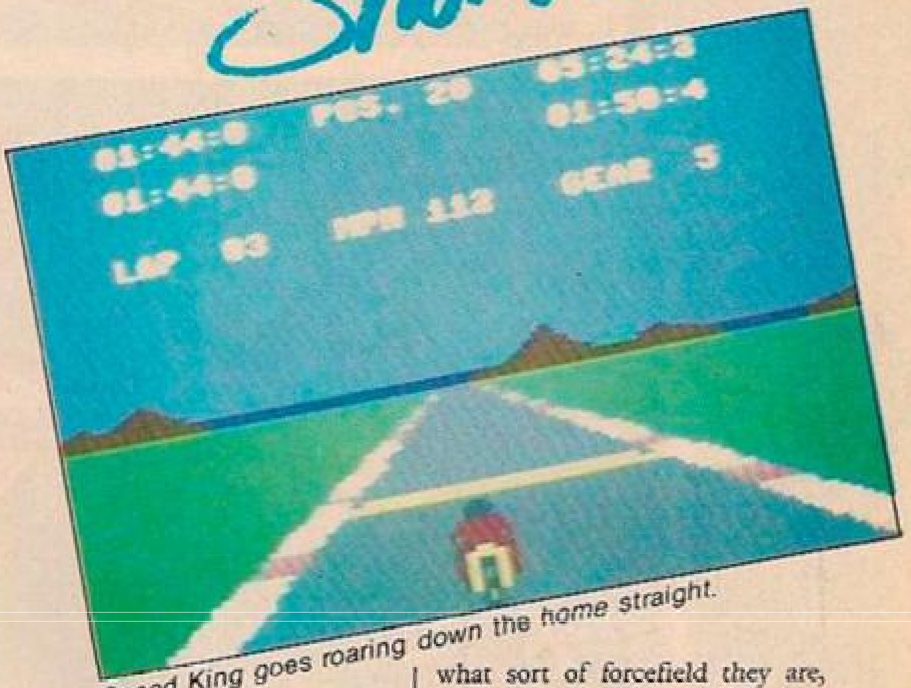
As well as practice and track preview options you can keep up interest by picking any one of 10 different circuits ranging from Silverstone to San Marino.

A thoroughly good game, and



Cylu wants to be a leader — ultimately Ultimatesque.

SOFTWARE *Shortlist*



Speed King goes roaring down the home straight.

Digital has more where that came from. They've spent the last two years developing a motorbike racing simulator, TT Racer, for the Spectrum. When's the off? — Digital says November for this late-starter.
Toby Wolpe

Cylu

- *Spectrum*
- *Firebird*
- *Arcade adventure*
- *£2.50*

★★★

WANNA BE a leader? Cylu does, but it's not a question of going down to the Job Centre. He must pass a test of wits, speed, logic and cunning — he has to travel through a 3D maze collecting items and depositing them into the IO unit of the computer. The lower the efficiency rating the better, if Cylu is to please the Otsan.

Programmed by Geoff Foley for Firebird's Silver label, it is a challenging game with excellent graphics but, it must be said, ultimately Ultimatesque. This is more of a recommendation than a criticism, I guess.

Cylu is a little hard to distinguish from the furniture on the first screen — you start standing next to the IO unit — but once you get him going he blunders cheerfully about like the robot in Alien 8. Hidden in the maze are 24 objects which must be collected, returned to the starting point and deposited in the master computer. This will please the Otsan.

Barring his way are 32 forcefields. These can be opened up first by examining them to find out what sort of forcefield they are, then finding the corresponding microprocessors and placing them in the master computer. It's necessary to refuel frequently otherwise you fail and the Otsan are not pleased. The trick here is that there is a Use command as well as a Get command — just grabbing one of the 30 fuel packs doesn't make any difference to your fuel rating. According to the hints it is also possible to refuel from forcefields, but this didn't work for me and the Otsan were not pleased. Nine teleport terminals when used with the correct teleport key enable you to tesser to isolated areas of the maze. To telesport, stand facing next to a telesport, select the telesport key which you want to use, then press use.
Paul Bond.

Nightshade

- *Spectrum*
- *Ultimate*
- *Arcade adventure*
- *£9.95*

★★★

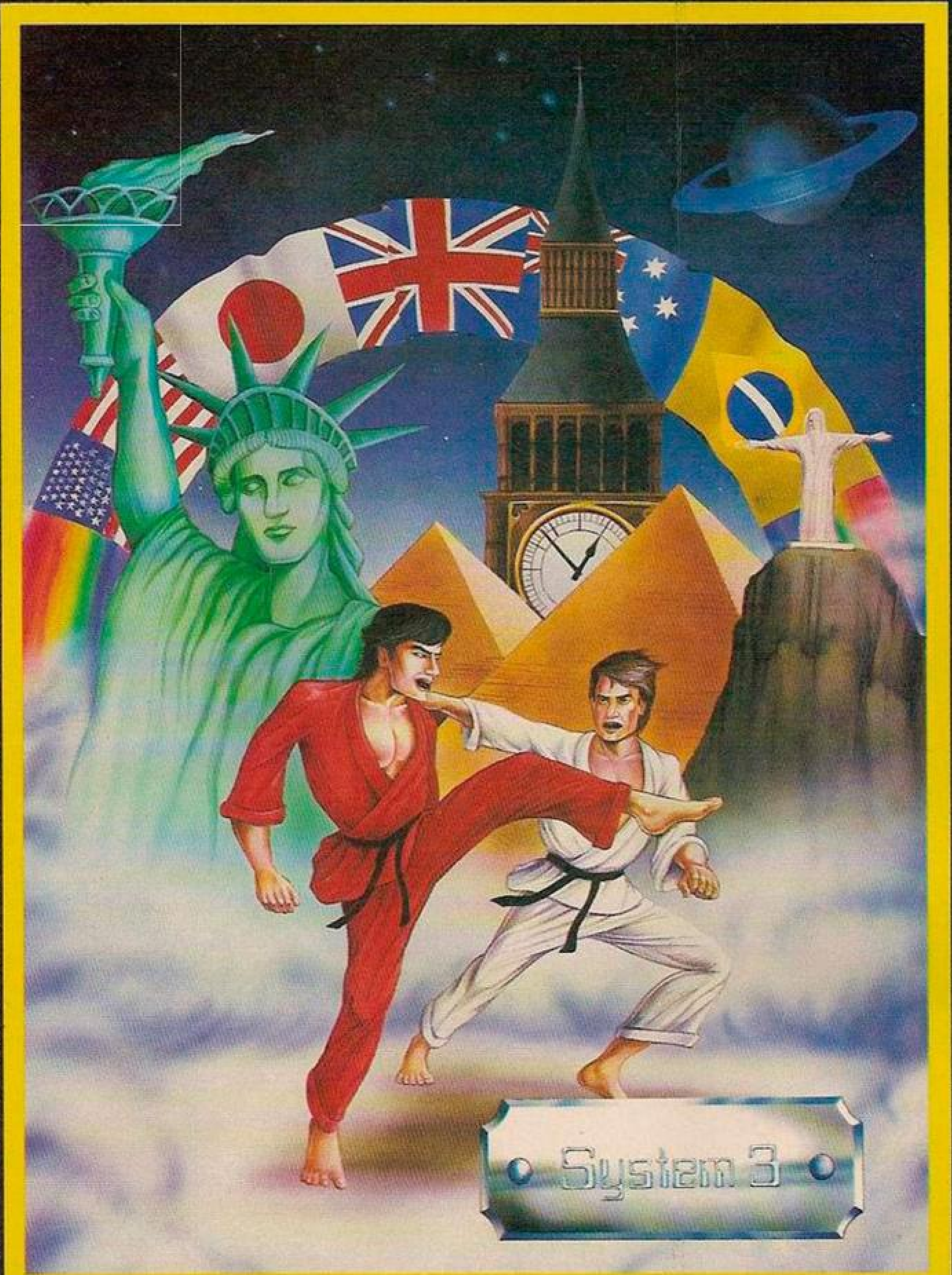
"VERY PRETTY" splutter the wretched cynics from SlamBang Software every time Ultimate launches a new masterpiece "but" and here you sniff a whiff of

(continued on page 31)



Nightshade — does Ultimate play the game?

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Star chart

Programmer's Toolbox and Basic Extensions

Amstrad
Sideways Rom
Micropower
£39.95

★ ★ ★

Designed to fit into Micropower's sideways Rom card, this Rom supplies the Amstrad with 33 new commands. Some, like Turtle — for turtle graphics — and Screen which sets up an alternative screen, can be used within Basic.

Others such as Find, a search and replace facility, are debugging and programming utilities. Quite a few of these facilities have already been provided on tape or in magazine listings.

Way of the Exploding Fist

Amstrad 464
£9.95
Arcade
Melbourne House

★ ★ ★ ★

Exploding Fist has survived the trip from the CBM-64 to the CPC 464 almost undamaged. The graphics are as good as on the original, speed of response is just as crisp, and the 18 different types of blows, jumps, blocks and kicks are all there.

Only the sound is disappointing. What came out of the CBM's speaker as the sickening thud of fist on chin, followed by a convincing grunt of pain, on the Amstrad sounds more like the noise of a tin being banged with a spoon.

Fu-Kung in Las Vegas

Amstrad 464
Amsoft
Platform
£7.95

★

The story line has it that you are a US Marshall — of Chinese extraction — working undercover in a series of Las Vegas casinos. However you would be hard put to fathom this out from the opening screen.

(continued from page 29)

vinegar "it's not a game". Well Nightshade is the prettiest show from the Zouche gang yet with Filmation II allowing you to smoothly scroll where no Spectrum has scrolled before.

As your knight errant walks through the 3D village maze, walls disappear leaving a line on the floor to remind you not to bump your nose. You must collect four charms to wipe out four plagues but your quest is hampered by some of the zaniest monsters ever.

These range from lower forms — lampshades, fizzers, slimes and blobs and supermonsters including a Chelsea supporter — well it looks like one, waving a scarf above its head, except that it has not noticed that the scarf has been knicked so it still gormlessly waves its mits in the air — mohicans, mini-mohicans and owls.

Stop reading now if you want to stay honest. Otherwise — you can collect a stack of antibodies to fire at monsters. Antibodies come in four delicious flavours — maces, spinning crosses, whirlpools and cucumber slices.

Any of these will kill the lowlife but beware if you hit an owl with a mace or a mohican with a whirlpool, a hooligan with a cucumber or a mini-moke with a cross, they turn into lowlife. Firing a cucumber at an owl turns it into a mohican which splits to cause double trouble if you hit it again. Likewise whirlpools turn mini-mokes into owls and split on a second hit, while crosses turn mohicans into hooligans before splitting, and maces turn hooligans into mini-mokes which split.

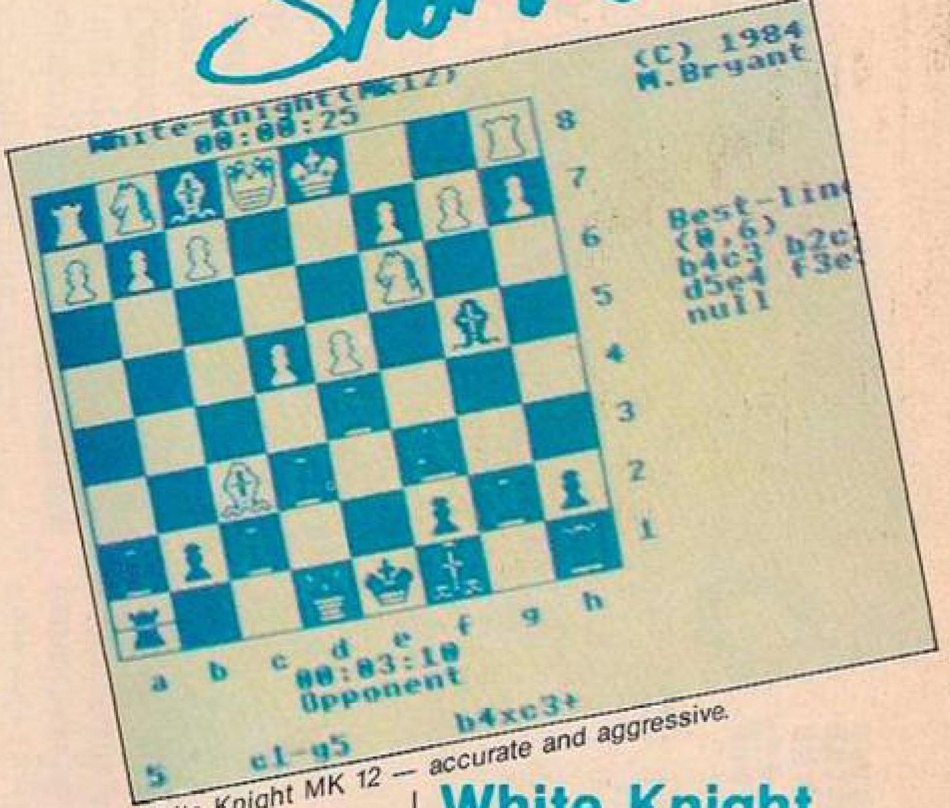
Stepping on a banana skin speeds you up and bottles restore your life. I said this genetic engineering sounded dangerous. And so to the plagues. An egg-timer will kill the grim reaper, hammer kills skeleton, crucifix kills monk and bible kills ghost. When you are close to your target the charm flashes. So much for problem-solving. Very pretty, technically brilliant, but ultimately not much of a game. Nightshade has finally turned this Alien 8 fanatic into a cynic.

Meirion Jones

Project Future — eminently playable.



SOFTWARE Shortlist



White Knight MK 12 — accurate and aggressive.

Project Future

- *Amstrad*
- *Arcade Adventure*
- *Gremlin Graphics*
- *£8.95*

★ ★ ★

CONVERTING SPECTRUM games to the Amstrad must be an easy number for any competent games programmer — the sort of job you can do in a month while waiting for inspiration for your next chart-buster. Both machines have the same processor so the task is largely a matter of rewriting the graphics routines. The trouble is that the Amstrad's graphics and sound are far superior to the Spectrum's, and straight conversions usually fail to exploit them to the full.

In this respect Project Future — a translation from a Micromega Spectrum game — is a little better than most. The graphics, at least, are a substantial improvement on the original; while the sound effects are almost orchestral in comparison with the Spectrum's beep.

As for the game itself, it sets you loose in a space ship with five different levels. Your aim is to collect eight destruct codes, activate the self destruct system and make your escape. All this is spread over 256 screens, although many of them are broadly similiar, consisting of a network of tunnels and chambers.

There are also scores of different *(continued on page 33)*

White Knight MK 12

- *BBC*
- *Chess game*
- *BBC Soft*
- *£9.95/£18.95 — Tape/Disc*

★ ★ ★ ★

UNTIL MEETING White Knight MK 12, the successor to MK II, it was this reviewer's boast that he had never been beaten at chess by a computer — despite challenges from such heavyweights as Cyrus Chess, Colossus, and QL Chess.

In fact, the program's author, Martin Bryant, concedes to QL Chess a slight edge, but for my money White Knight MK 12 reigns supreme. With an ELO rating of over 1850 it can handle all but the strongest club players.

Playing strength and speed of response, are of course, the most important features of a chess program. In other respects — graphics, ease of use, number of playing options — White Knight is also well up to scratch.

Instead of choosing a level you simply enter the average time you want the program to spend on each move. Entering a move is just a matter of positioning the cursor. There are also options for back-step, fore-step, Tournament Play, problem solving, and saving a game to disc or tape.

If you're feeling smug about your superiority to micro chess programs, White Knight will give you a jolt.

Simon Beesley.

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Star chart

Amazon Warrior

CBM-64
New Generation Software
Arcade Adventure
£7.95

★ ★ ★

At first glance this game resembles that US chart-topper Forbidden Forest. In the opening scene, the Jungle, armed with only a blow pipe you have to cope with snakes as they fall from the tops of the foliage. The similarity here is striking: there is the same sinister atmosphere and the same doomy music.

But if you manage to pass on to the later levels — no easy task since a blow pipe is a tricky weapon to use accurately — the game reveals its differences: underground cavern and a ruined temple. The graphics are even better than in Forbidden Forest and the soundtrack throughout is superb.

Cheops

Amstrad CPC-464
No Man's Land
Adventure
£8.95

★ ★ ★

Welcome stranger to the year 2300 BC. You are an Egyptian brigand attempting to violate the Pharoah's inner sanctum (isn't it a lovely day for violating the Pharoah's inner sanctum, missus) and seek out the fabulous treasures hidden in the burial chamber.

There are over 300 chambers to search, and watch out for the blood-sucking tarantulas and the venomous serpents. Keep taking the hieroglyphs. This game is worth playing if only for its unbelievably detailed and whimsical introductory sequence which tells you how to play the game — shocking departure for an adventure. "This nice little tarantula is keen to test your blood group". And they say the French have no sense of humour. This well-executed 3D arcade adventure is a welcome foray away from the Oric territory by the French company.

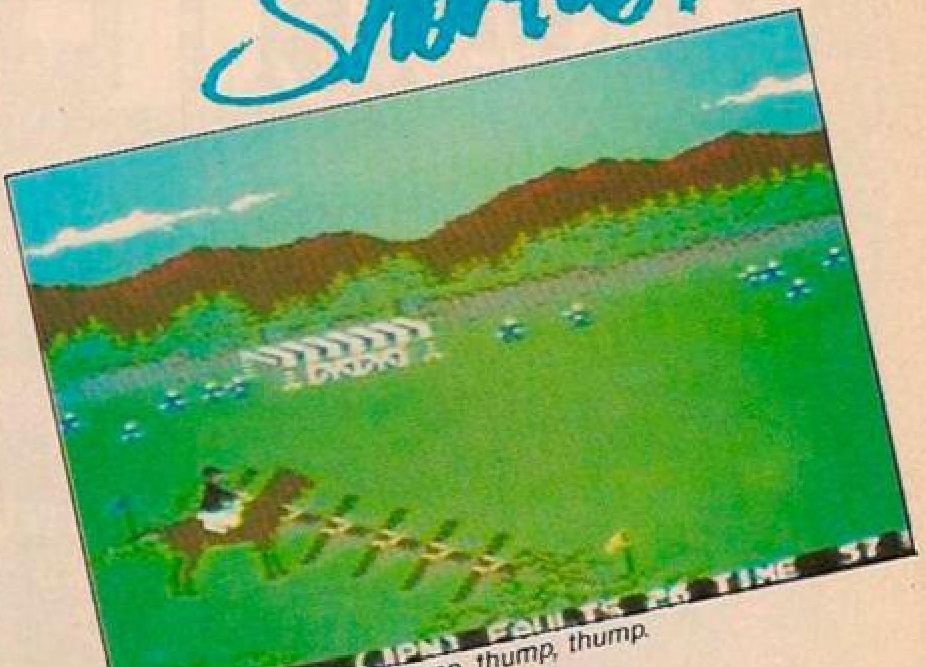
(continued from page 31)

alien types, automata mainly, which come at you from all corners in Robotron style. A minor flaw in the game is that the aliens do not play fair when you shoot them. Instead of counting to 10 they regenerate immediately on the spot. This means that if they pen you in a corner there is no chance of escape, even if you come out with your single gun blazing.

None of this is particularly original, and, in fact, the game is a standard fare multi-screen arcade adventure. But it is eminently playable, and no worse than the bulk of Amstrad software to date. Developing software is a lengthy process, and it will be a while yet before we see programs that really take advantage of the Amstrad's potential.

Simon Beesley.

SOFTWARE Shortlist



Summer Games II — thump, thump, thump.

Summer Games II

- *CBM-64*
- *Decathlon*
- *US Gold/Epyx*
- *£14.95 — disc*

★ ★ ★ ★

THUMP, THUMP, THUMP. An athlete pads across the screen, torch in hand, to light the Olympic flame. Doves fly off and as your finger itches for the fire button — this is a US Gold game after all — you relax into the opening ceremony of the classiest decathlon game yet. Up to eight of you can don the shirts of your adopted countries. The CBM-64 solemnly plays your national anthem — or not as the case may be. Australians may be unwilling to stand for Waltzing Matilda and if this game ever threads its way through the iron curtain Russians will point out that although the Internationale is one of their four anthems this century it has not been used since the Second World War. Never mind, "Arise ye starvelings from your slumbers" must be a red flag to bullish Americans.

The quality of the 10 sports game is variable — as usual with these programs but the strength of the competitive atmosphere carries it through the weaker moments. In the triple jump all the competitors are black — even if they are Norwegian — and in most other events they are all white. You race down the track and time your hop, skip and jump. The big stadium TV screen in the background showing a close-up is a neat touch. Rowing is again a matter of timing the reach and pull. Throwing the javelin was my favourite. Down the runway, time your plant and then throw when the angle reaches about 30°. Most of the work has gone into the show-jumping with good tapestry graphics and great animation even if the horse looks more like Muffin the Mule than a thoroughbred jumper. Cycling is a real joystick destruction derby as you grind the stick around the contacts continuously — with no gears it hardly seems worth it.

Kayaking needs some of the skills of a River Raid and is an enjoyable game in its own right as you try to negotiate the gates in the rapids — and there's high jump and fencing too. Then comes the grand finale closing ceremony with fireworks, jet-pack man and balloons. Overall Summer Games II is the best computer Olympics even if some of its component parts are weaker than Daley Thompson and the rest.

Meirion Jones.

Tour de France

- *CBM-64*
- *Activision*
- *On yer bike*
- *£9.99*

★ ★ ★

PARIS, LOUVROIL, Bordeaux, Saint Girons, Grenoble — developed with the Society of the Tour de France, this is geographically and graphically one of the best sport simulations around. The main carp is that though there may be up to six players on the scoreboard, only one cyclist may race at a time. Nevertheless, the quality of the graphics more than compensates for the easy option.

It is a real joy to hear the Marseillaise during loading — such a relief from the Stars and Stripes Forever. And you get to hear such gems as the Finnish, Danish and Hungarian national anthems.

But before you indulge yourself in an orgy of international jingoism you must choose between Competition et Entrainement. A bit pretentious when it seems de rigeur for every French person to have a T-shirt saying "Training" on it. If you choose Competition, the name/country selection screen appears. Hungary is your first choice, nothing to do with the programmers having names like Zoltan Mericske, Pal Balog, Gyvla Valovics and Ivan Balazs.

And now we must choose between Le Grand Circuit and just doing a few stages or etapes. The method of play is the same, only one cyclist on screen at a time. After the route selection, the data for each etape is loaded and played separately. Did you know the French for fast-forward is bobiner?

This is a joystick waggler à la Decathlon, but once you have wrecked your joystick there is a keyboard option to keep you going until the shops open on Monday.

Paul Bond.

Tour de France — hear the Marseillaise.



(continued on page 35)

THEIR ONLY HOPE WAS YOUR PROMISE TO BRING THEM BACK ALIVE....

BEACH-HEAD II



The continuing saga pits allied forces against the cruel dictator who escaped the destruction of the fortress with remnants of his army and prisoners captured during the land battle.

Produced for the COMMODORE 64 and coming to a computer store near you!

Written by Roger & Bruce Carver • Directed by Bruce Carver • Produced by Chris J. Jones • Distributed by David L. Ashby
Illustration by Oliver Frey (Newsfield Publications) • Manufactured in the U.K. by U.S. Gold.

Star chart

Barry McGuigan World Championship Boxing

CBM-64
Artic
Sport simulation

★ ★ ★

Along with Rocco, Frank Bruno, we now have a Barry McGuigan program. All of these games seem to lack a certain je ne sais quoi which is present in games like Way of the Exploding Fist.

The central characters seem strangely unresponsive to joystick control in all boxing games whereas in Fist you can at least get your boy to move about a bit instead of standing there taking endless right hooks until he falls down.

This version of the idea has some nice touches: training camp, where you can build up endurance, stamina and so on.

Steve Davis Snooker

CBM-64
CDS Software
Snooker simulation
£8.95

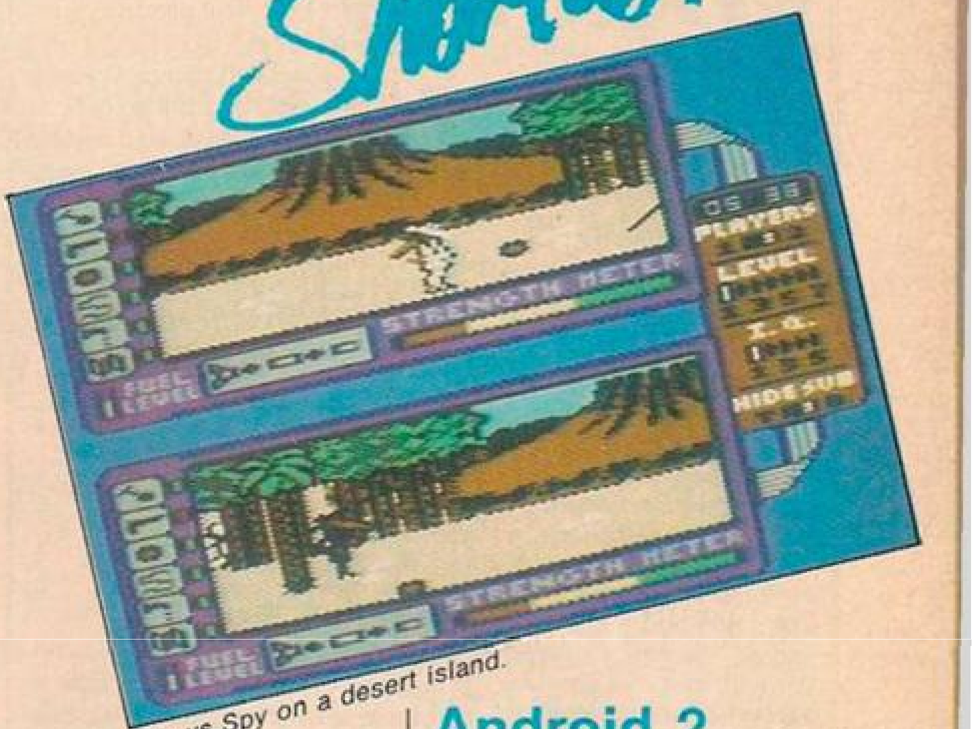
★ ★ ★

Just beyond the far cushion lie the icons, and they're what mark this game out from most snooker simulations. Flick the cursor across to them and you can pick options from the main menu like speed, playing colours or two-player game. You can even pick the edit mode to fudge some trick shots.

You can also be very precise about the type of spin you want to use. In the bottom left of the display is a large version of the cue ball. Place the cross at the point on it you want to strike, and then move the joystick or keyboard control to select the weight of the shot.

Spin and power controls allow everything from fine cuts to deep screw-backs. But seven points away for the sound — more like machine-gun fire than ivory on ivory.

SOFTWARE Shortlist



Spy vs Spy on a desert island.

(continued from page 33)

Spy vs Spy

- *CBM-64*
- *Arcade Adventure*
- *Beyond*
- *£9.95*

★ ★ ★ ★

As you float down on to the desert island with only your parachute to shield you from the sun all is quiet. All that is, except for the sound of waves gently smashing the wrecks of Simon le Bon's and Richard Branson's boats on the beach and the cries of a few lost seagulls.

Your mission is to locate the parts of the missing XJ4½ missile before a rival agent beats you to it and then escape by submarine before the volcano errupts. It is in other words a rerun of Spy vs Spy I with palm trees instead of furniture and coconut bombs instead of umbrella stand traps.

The top half of the screen shows your agent — the white spy and the bottom shows the rival black spy which can be a friend or the computer. You can hamper the opposition by digging pits and covering them with a stick to hide them, setting rope snares from trees using coconut bombs and napalm as land mines and fire up to three shots from a gun if you can find it.

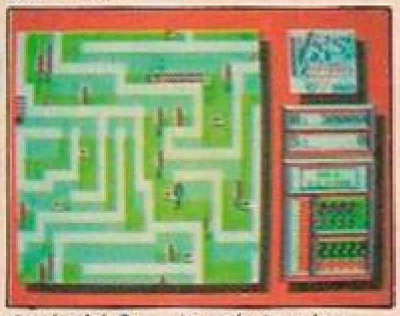
The traps and map are set out on the icon-style trapulator — just as in the original but the cartoon graphics are more ambitious than in the first part. Quicksand is the major natural hazard not counting drowning if you try to reach your submarine when you are not strong enough. The game can be played at seven levels each with different island layouts including some where you have to swim from one island to enother.

All very nice if not original. The Antonio Prohias cartoon strip in *Mad Magazine* which the game is loosely based on has been running for 25 years but please Beyond don't try it with the computer game unless you can come up with some new ideas.

Sam Son.



Death Star — over-active.



Android 2 — tough to play.

Death Star

- *BBC*
- *Superior Software*
- *Shoot'em-up*
- *£9.95 (£11.95 disc)*

★ ★

Two years ago, this game would have been described as fast and furious. Now it seems merely overactive. One likes to pause for breath occasionally but Death Star never gives you a moment's peace. For a start there is four-directional scrolling which means that the screen is slipping and sliding all over the place.

At the same time Workers and Warriors are constantly harassing you. When you have steadied yourself you have to latch on to one of the passing planetoids and pump it with bullets until it emits crystals. Collect enough of these and you can destroy the Death Star, a large mothership being created elsewhere. Then you move on to the next Zone.

All these complications cannot disguise the fact that the game is at heart another space shoot'em-up. Most of us thought this category had been laid to rest. It is also another Mode 2 game that uses a black background. After a while they all look the same.

(continued on next page)

Android 2

Amstrad CPC-464
Vortex
Shoot 'em-up
£7.95

★ ★ ★ ★

Vortex have produced consistently good games like TLL and Cyclone not to mention the amazing Highway Encounter — but the first version of Android is remembered in this office as a bit of a fall from grace. The new game in its Amstrad incarnation is an excellent overhead view of a maze in which assorted millitoids, mutants mines and bouncers are busy enacting an everyday story of cosmic weirdness. And the Maze of Death is only the first screen. You can also visit the Paradox Zone and the Flatlands.

You control the Android 2 in its mission to rid these areas of their gruesome denizens. The millitoids are very big millipedes oozing their way round the maze corridors. You must shoot them in the head three times. To score extra points you can dispassionately dispatch the unhappy mutants, whilst trying not to trip over mines. The obstreperous bouncers are invulnerable, hence better left to themselves.

Fair warning — this is a tough game to play; you will need to summon all your reflexes, co-ordination and base cunning to get out of the Maze of Death, let alone the other places.

You have to achieve all this and return to the transporter capsule before the departure deadline. Excellent graphics, notably the multi-screen wraparound effect.

Paul Bond.

Star chart

World Cup II

CBM-64
Artic
Sport simulation

★ ★ ★

It may lack the sophistication of the Commodore 3D football progam — for example, players can run straight across the top of the goal — but still an enjoyable game for all that.

You can choose from only two shirt colours whether you are Brazil, Argentina, West Germany or England. Control is as in the Commodore game, you control the player nearest the ball, and you can play against the computer.

Sound effects are minimal and the background music restful. Maybe music hath charms to soothe the Inter-City Firm.

Red Arrows

Spectrum
Database
Aerobatic simulation

★ ★ ★

Concorde flypast, Manhattan loops, pyramid rolls — not exotic forms of confectionery but all manoeuvres you can perform in this interesting variation on the flight simulator theme. Flying a British Aerospace Hawk you can practise individual manoeuvres or fly in a display.

Red Arrows pilots were consulted about the game, so it has to be about as good as you can get it on the Spectrum. If you buy the game you can win a weekend with the Red Arrows by submitting the highest score achieved in any month until the competition ends on January 31, 1986.

3D Stunt Rider

Amstrad CPC-464
Amsoft
£8.95

★ ★

The 3D bit is at the beginning where you steer towards the ramp. Then you switch to an Eddie Kidd side-view. Instead of barrels you jump over buses.

There are five increasingly difficult levels.

(continued from previous page)

The graphics in Death Star are not, as is claimed, stunning; not when you compare it with Mode 1 games like Frak and Contraption, or, for that matter, with Superior Software's excellent previous game, Repton.

If anyone still wants to write shoot'em-ups, why not go back to their roots — with Space Invaders in Mode 1? Of its kind the game has never been bettered.
Simon Beesley.

Pinball Construction Set

- *CBM-64*
- *Ariolasoft*
- *DIY*
- *£11.95 (£14.95 disc)*

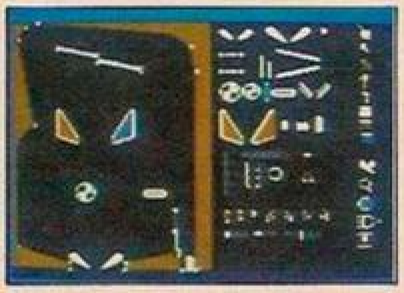
★ ★ ★ ★

ARIOLASOFT IS giving maximum support to pinball addicts. First it brought over from the US the best pinball game ever written, David's Midnight Magic; now here is a program for designing your own pinball game. It gives you total control over every element on the table, from the layout and colours right down to the speed of the ball and the sound each bumper makes.

There are five demo games to get you started, but doing it yourself is easy. The screen is divided into two parts. On the left there is the board, on the right a selection of command icons plus all the normal pinball items — flippers, kickers, slingshots, magnets, gates, roll-overs, and so on. To build a game you just position a hand shape over the parts you want and drag them onto the board. With the command icons you can fine tune a game.

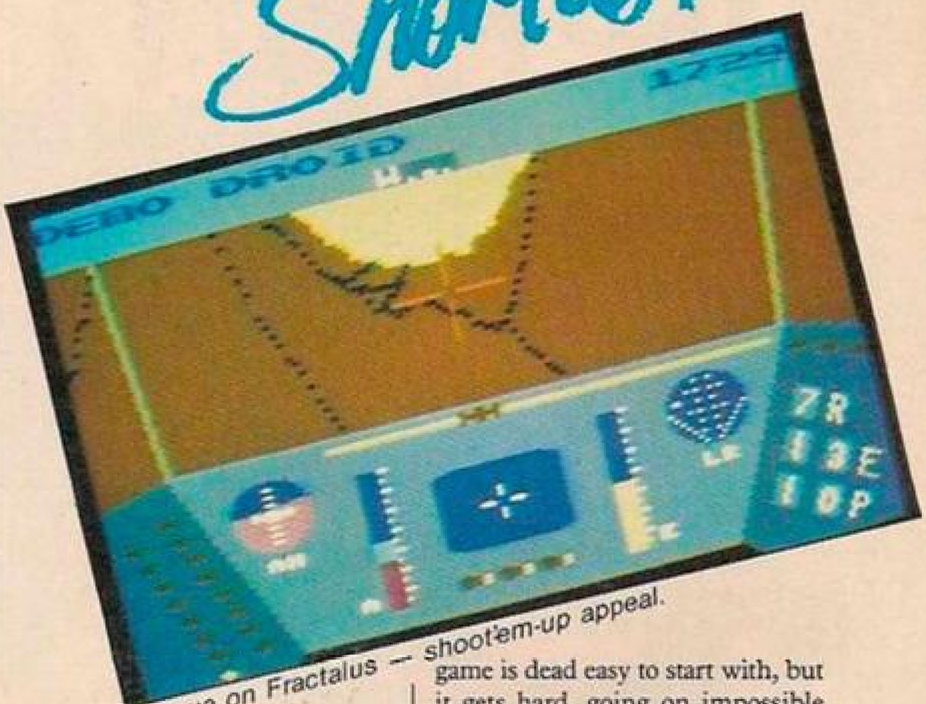
They let you adjust factors such as the scoring values and flipper action, load or save games, and change the shape of objects.

Creating your ideal pinball game is, of course, the main thing. But there is also pleasure to be had in just fiddling with the controls. Turn down the gravity, for example, and the ball takes five minutes to drop to the bottom; step up the elasticity and it whizzes around in perpetual motion.
Simon Beesley.



Pinball Construction Set — create your ideal.

SOFTWARE Shortlist



Rescue on Fractalus — shoot'em-up appeal.

Rescue on Fractalus

- *CBM-64*
- *Activision*
- *Shoot'em-up*
- *£9.95*

★ ★ ★ ★

IT STARTS OUT like a Space Shuttle simulator, with a cockpit full of controls and a view out of the window of your Valkyrie fighter. When you reach the planet Fractalus you fly in and out of a cavernous three-dimensional landscape, which is brilliantly drawn. Laser gun emplacements on the hilltops try to blast you out of the skies — this is a shoot'em-up, with the Jaggies as enemies. But your mission is to locate downed pilots, land and rescue them.

When you have enough, or all of them, you can boost back to the mother ship to refuel, and the game moves you up to the next level . . . this goes on for hours.

Picking up a pilot involves landing close by, turning the engines off, waiting as he stalks towards you in 3D, knocks on the airlock door and climbs aboard. At the higher levels this gets quite tense. (And "don't worry about being captured — they don't take prisoners".)

As the levels get higher the Jaggies get more numerous and more accurate. They send saucers at you. Pilots get more numerous, and not all are what they seem. Also you discover that away from the pole, Fractalus has a nine-minute day, so you have to learn instrument (night) flying. So, the game is dead easy to start with, but it gets hard, going on impossible — like Star Raiders, in fact.

Rescue on Fractalus was written by Lucasfilms, and uses fractals — the mathematics of fractional dimensions — to produce the convincing landscape. These were developed for the "genesis effect" sequences in Star Trek II and III, using a Dec Vax minicomputer.

The game first appeared on the Atari micros about two years ago. While it was never officially released, it has a wide circulation as "Behind Jaggi Lines". Atari cognoscenti consider it the best game ever written — after Star Raiders itself.

Activision has now released it for the Commodore 64, Atari and Apple micros. The Commodore graphics look just the same as the original Atari ones, the sound effects are almost as good, and there seem to be few other changes. Instead of turning the engines off (hit E), you now turn the System off (hit S). Also there are "Ace" pilots to rescue — worth 2000 each instead of 200.

The original Atari version had 99 levels. I'm not sure how many the Commodore one has — you aren't allowed to start higher than 16. Also, on the Atari version, the ship responds better to the controls — the Commodore one suffers from terrible oversteer.

Finally, the landscape does not seem as stable. It's like playing a record on a music centre instead of a real hi-fi — the notes seem to be there, but some of the impact is missing . . .

However, Rescue on Fractalus is still a brilliant game, and should appeal to any shoot'em-up fan.
Jack Schofield.

It's the dead of night — no one can hear you scream. No one, that is, except David Williams, our adventure expert. Call him on 041-774 8937 after 9pm for help with your adventure problems — or nightmares . . .

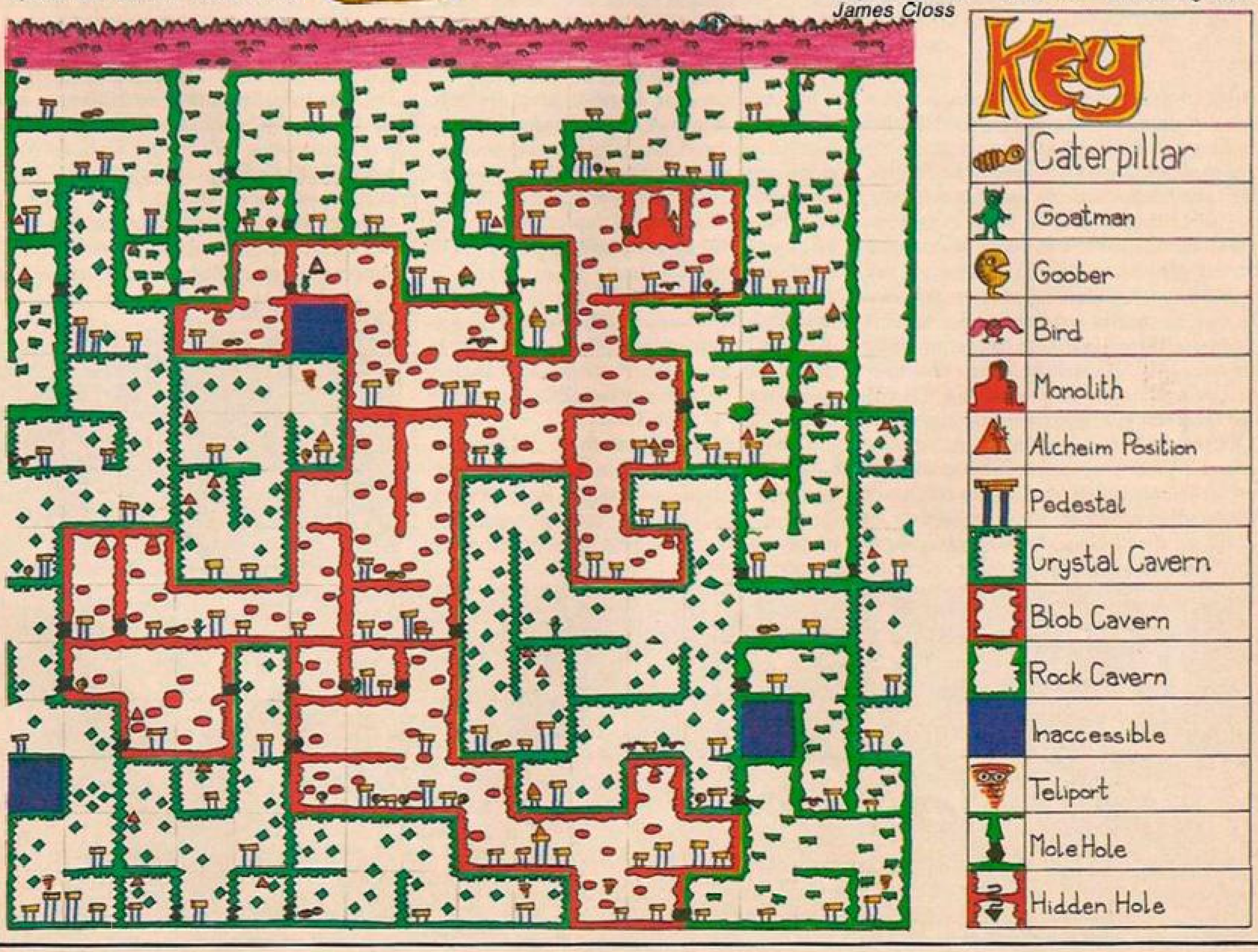
HOT SHOTS

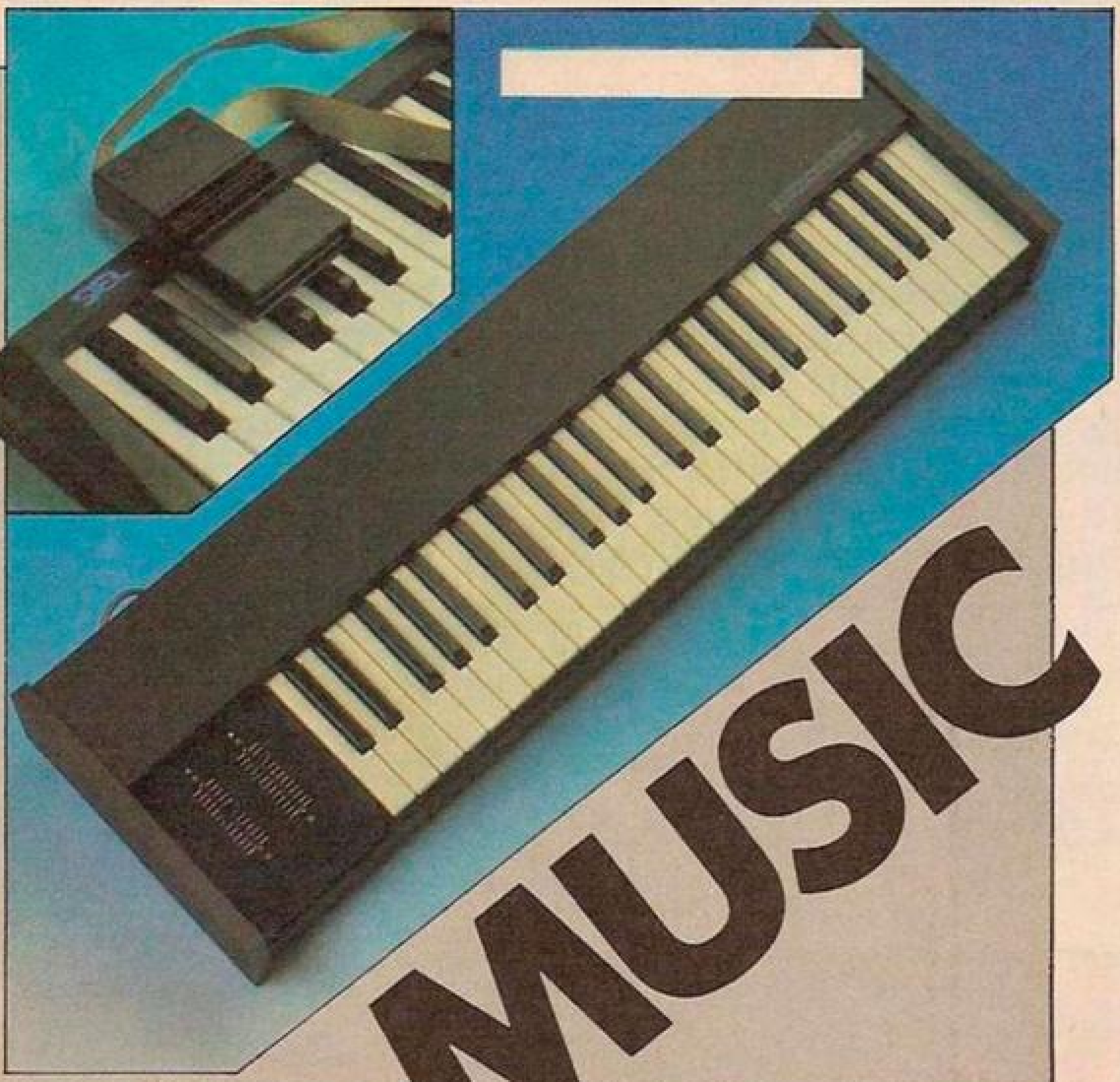
Heard any good pokes lately? Smashed any high-score barriers? Or perhaps you've just put the finishing touches to a game map that will put thousands out of their misery. Publish and be damned — and paid! Send in your secrets, high scores and maps to Hot Shots, *Your Computer,* Room L221, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

By James Closs

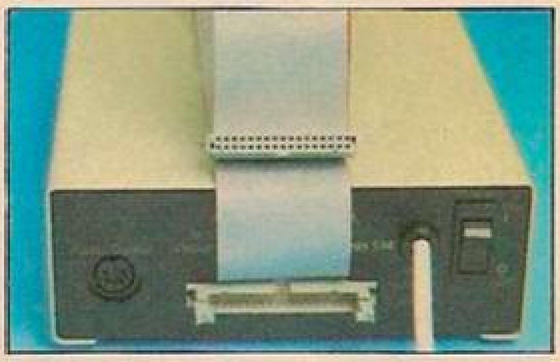
Nodes of Yesod

First locate your position on the map. Next, catch the mole. Wait for the mole on any surface screen, preferably with three craters. When it appears, simply somersault into it, fall down a hole into the rock caverns. To dig, press 1 to release your mole, then move it to the position of the Mole Hole. The spaceman cannot move while the mole is digging. Goobers, goatmen, birds, and caterpillars must be avoided at all costs. Other sprites can be destroyed by releasing your mole and moving it into their path. When you dig make sure you are on a safe platform, and destroy Stunners with your mole at once. To avoid teleporting move your mole immediately into the whirlwinds. When no more come, it is safe to move. If you do wish to teleport, jump into the whirlwind — otherwise you may find yourself in the middle of a breakneck fall. A teleport always transports you to the square to the right or left of it. Falling too far results in your candle being snuffed but the deep chasm at the top right can be dropped through and you will not die. To complete the game bring eight alcheims of the same colour to the monolith. The red spaceman will steal one of your alcheims and return it to from whence it came. On the map only *possible* alcheim positions are shown. Sometimes you may find a space helmet — extra life — or nothing at all.
James Closs





MUSIC MICR



Above from left to right: Musicsound 64; Music 500; Sound Buggy detail; Screen shot of Romantic Robot's Music Typewriter; screen shot of Island Logic's The Music System.

IS THE HUMBLE home micro being reborn as a musical instrument? The signs are strong that it is. There has been a dramatic upsurge recently in the quality and scope of musical software and add-ons for the home micro, and, in some cases, an equally dramatic drop in prices.

And a new generation of micros is emerging in which the sound-making facilities are not merely there to give added zap and pow to games.

In coming months the trail-blazing Yamaha CX-5M synthesiser-computer will be joined by a similar MSX machine from Toshiba. Meanwhile, Yamaha has developed a CX-7M based on the new, improved second generation MSX specification.

Even Sir Clive who, until now, has resisted the mixing of music and micros, has given in to the orchestrated requests of Spectrum owners by including a sound chip, albeit a simple, three-voice affair, in the 128K version of the Spectrum.

Further up-market, Atari's 16-bit ST models will come equipped with the MIDI interface for direct connection to electronic instruments. And Commodore's Amiga promises to have some of the most sophisticated sound-making facilities ever offered on a microcomputer.

But existing micro owners have not been abandoned. Several powerful add-on music synthesisers for home computers are about to reach the market. One of these is from Commodore who have spent about £250,000 developing a new range of musical software and peripherals. Commodore will be giving music a big push this Christmas.

Almost every post-ZX-81 home computer has had some sort of sound-making facility built into it. These have ranged from the dreaded Beep of the Spectrum to the relatively sophisticated multi-voice synthesisers of the BBC, Commodore 64 and Enterprise machines.

With the notable exception of Yamaha's CX-5M, no existing home micro has been designed with music-making as a primary function. But, with a little programming ingenuity, almost any home micro can be put to musical use.

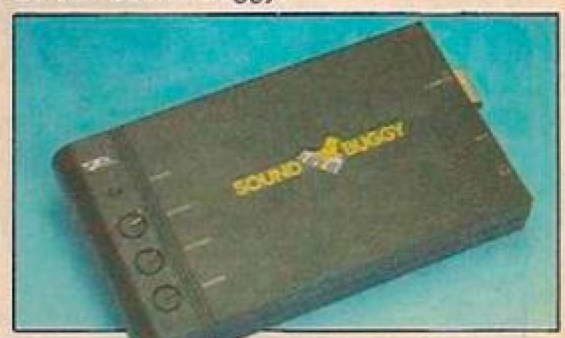
Even the ZX Spectrum has been given a musical role. Romantic Robot's **Music Typewriter** — cassette £9.95 — manages to coax the Spectrum Beep into producing recognisable tunes. An overlay — not suitable for the Spectrum+ — converts the computer keyboard into a musical keyboard and allows notes to be entered on an on-screen stave — the set of five parallel lines on which music is written.

The composition can then be played back with the music scrolling past on the screen as it Beeps. You can produce a very legible print-out of your masterpiece and an optional data convertor program — £4.95 extra — allows you to turn it into a machine-code routine for use in your own programs.

The Music Typewriter takes the Spectrum about as far as it is possible to go within the limitations of the Beep command. But you are still stuck with one, rather feeble, note at a time. For more and fuller sounds you will have to move outside the Spectrum and Romantic Robot is now collaborating with another company, Micro Musical of Coventry, to produce a MIDI interface that will allow the Music Typewriter to drive external electronic instruments.

Compared to the Spectrum, Acorn's BBC computer is a musical virtuoso. In fact, so many

Below: Sound Buggy.



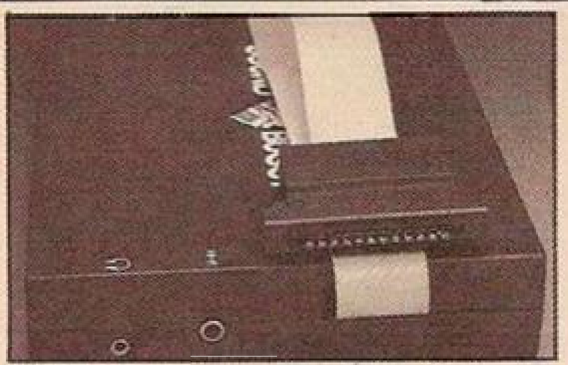
Suppliers of musical software and add-ons.

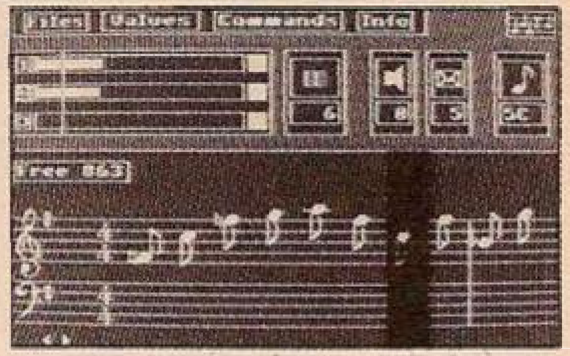
Musical software

Spectrum	Music Typewriter	£9.95 (c)	Romantic Robot, 113 Melrose Avenue, London NW2 4LX (01) 625 9463
BBC	Music Maker	£9 (c) £12 (d)	FSoft PO Box 352, Brighton BN1 3AY (0273) 736042
	The Music System	£12.95 (c) £24.95 (d)	Island Logic, 22 St Peter's Square, London W6 9NW (01) 741 1511
CBM-64	The Music Advanced System:	£34.95 (d)	Island Logic, 22 St Peter's Square, London W6 9NW (01) 741 1511
	Concise	£15.95 (c) £19.95 (d)	
	Music Studio	£14.99 (c) £19.99 (d)	Activision
	Music Construction Set and Studio	£14.95 (d)	Ariolasoft
		£14.95	Commodore

Add-on keyboards.

CBM-64	Music Maker	£19.99	Commodore (as above)
	CMM 25	£19.99	Siel (UK), Ahed Depot, Reigate





O, PLEASE

Tony Sacks rides with the tide, eats to the beat and goes with the flow.

parameters are needed to define a sound that they can easily deter the Basic programmer. Several software packages are now available to ease this process.

One of these is FSoft's **Music Maker** — cassette £8, disc £12 — which provides high-resolution graphical images of how the sound varies with time. There are two of these displays — one for amplitude, the other for pitch — and they give the user an instant visual indication of any changes made to the sounds.

Audible feedback is provided by pressing keys in two rows of the qwerty keyboard that are converted into a musical keyboard. Up to three notes can be sounded simultaneously and the "keyboard" can be split to allow two different sounds to be played in each half.

Once you are happy with your sounds you can use them — or the preset sounds supplied with the package — to "record" a piece of music using the sequencer section of the program. A rudimentary musical stave display is provided of the notes you play.

Music Maker's greatest strength is that it shows you clearly, at a relatively low cost, the effects of varying the many BBC sound parameters. FSoft is now working on a similar package for the Amstrad computers which have until now been starved of quality musical software.

It is possible to take the BBC even further as a music-making machine with the aid of Island Logic's **The Music System** — cassette £12.95, disc £24.95. This is a meticulously-designed piece of software that uses icons and pull-down menus to allow music to be entered, stored, edited and printed out with the greatest of ease.

After selecting the appropriate icon from the main menu screen you find yourself in one of five modules. These are: a synthesiser which allows you to create sounds using the BBC's music chip; a keyboard, which turns the BBC into a four-channel "tape recorder" that stores tunes as you pick them out on the Qwerty keyboard; an editor which allows you to enter notes directly on a musical stave or two change notes already displayed; a printer to produce hard-copy versions of your compositions; and a Linker — only in the disc version — that allows up to 10 separate compositions to be played back together in any order you choose.

This may sound complicated but the beauty of The Music System is that it is so well designed that you can be creating music within minutes of starting to play with it. Using TMS is made even easier by the excellent graphics and the professionally produced instruction manual which could serve as an example for games publishers.

There are some niggles — for example, the stave displays only one channel of sound at a time — but the overall design is almost faultless.

Island Logic have now converted TMS to run on the Commodore 64 and, in doing so, have improved and expanded some of the functions to take advantage of the 64's bigger memory capacity.

The most significant change is the addition of a sixth module that allows the package to communicate with the outside world via a MIDI interface plugged into the back of the 64. You can use this either to "record" external music synthesisers or to drive these outside instruments from music originally written for the 64's internal chip.

You can record an external MIDI instrument on any of six "tracks" while listening to any or all of the other tracks being played back. The music recorded via MIDI can be converted into a form which will drive the Commodore's SID sound chip.

Other changes from the BBC version of TMS include a simplified filing system; the ability to include lyrics on print-outs; and the inclusion of a cut-and-paste facility in the editor section that allows you to move chunks of music around within a composition.

Island is producing the Commodore TMS in two versions: an Advanced version — disc £34.95 — and a cut-down Concise version — cassette £15.95, disc £19.95 — which consists of the editor and keyboard functions. There is also talk of cheap — under £20 — MIDI interfaces for both the BBC and Commodore machines but no release dates have yet been scheduled.

The Commodore version of TMS still displays just one musical part at a time. If you want all three musical parts to appear on the screen simultaneously you could try Activision's fun-filled **Music Studio** — cassette £14.99, disc £19.99.

Activision's games heritage shows in this colourful package which uses a joystick to control the movements of a conductor's baton — looking more like a demented tack — which picks up notes and deposits them on a stave to create a composition.

A particularly attractive feature of this package for newcomers to music is an alternative composing screen which uses splodges of differing colours and sizes to depict notes. This avoids the confusing "sticks and blobs" notation of conventional scores and allows the musically illiterate user to compose music intuitively. By reverting to the conventional display, these splodges are "translated" to their traditional equivalents.

A third screen allows the user to tinker with the 64's sounds using the joystick to manipulate a synthesiser control panel.

(continued on next page)

		Road, Hookwood, Horley, Surrey RH6 0AY (0293) 776153/4					Sandiacre, Nottingham NG10 5BA (0602) 394000
CMK 49	£125	Siel (UK) — as above			Microsound 64	£150	Microsound, PO Box 14, Petersfield, Hants. GU32 1HS (0730) 87403
MusicMate	£99	Sequential Circuits, PO Box 16, 3640 AA Mijdrecht, The Netherlands (02979) 6211					
			BBC		Echo 1	£100	LVL (as above)
MusicWare packages	£34.95 each	Sequential Circuits (as above)			Symphony	£125	ATPL, Station Road, Clowne, Chesterfield (0246) 811585
Echo 1	£100	LVL, Scientific House, Bridge Street,					

(continued from previous page)

The comprehensive — and largely comprehensible — instruction book for the Music Studio mentions the possibility of a MIDI interface but this has not yet been implemented. Beneath the glossy surface of this package lies a well thought out piece of software that offers many of the facilities of Island's TMS — with the notable exception of real-time recording — and is probably more accessible to the games-playing non-musician.

A third package designed to exploit the Commodore 64's SID chip is the **Music Construction Set** — disc £14.95 — from Ariolasoft. This does not have the striking graphic presentations of the other packages — in fact, the screen is rather cramped and notes on the stave tend to blur into one another — but it does include some impressive examples of what the SID chip can achieve when pushed.

A particular tour de force is a rendition of the Flight of the Bumblebee in which, as the music plays, the notes scroll past at an unreadable speed.

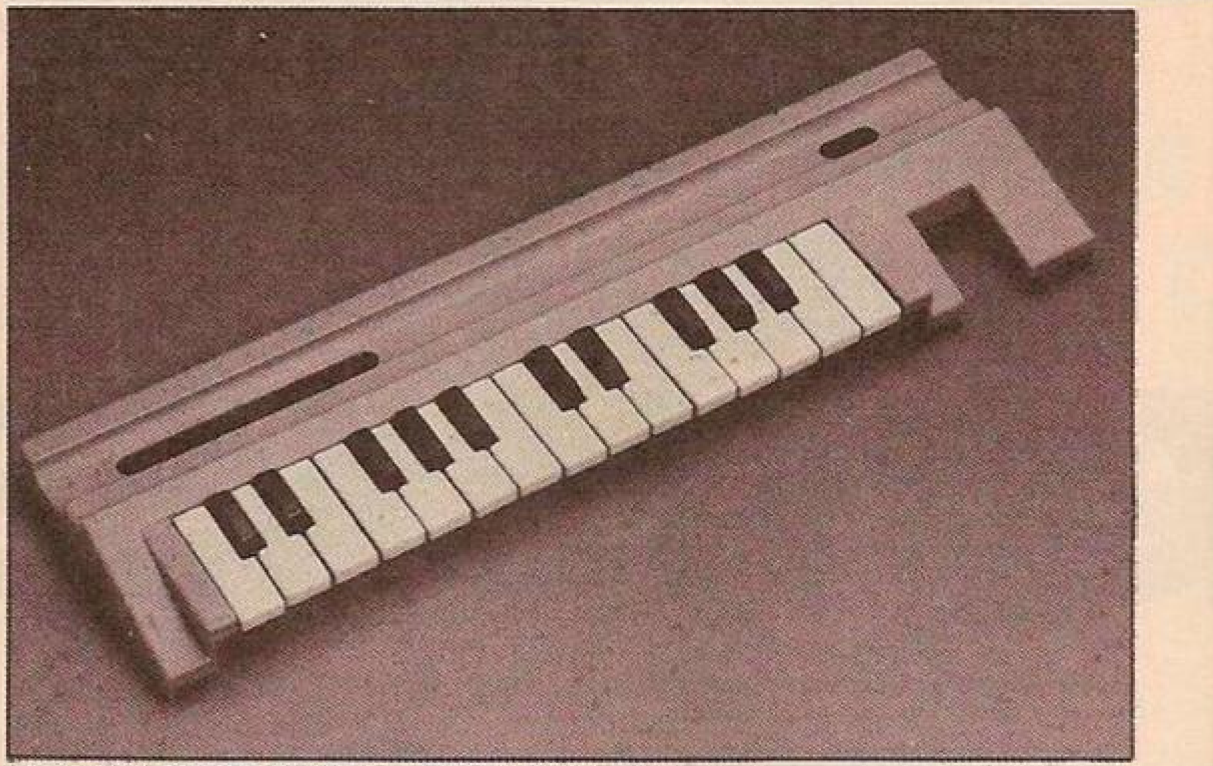
The Music Construction Set has just 13 preset voices which cannot be altered. It does not allow any form of real-time recording and cannot produce print-outs of musical scores.

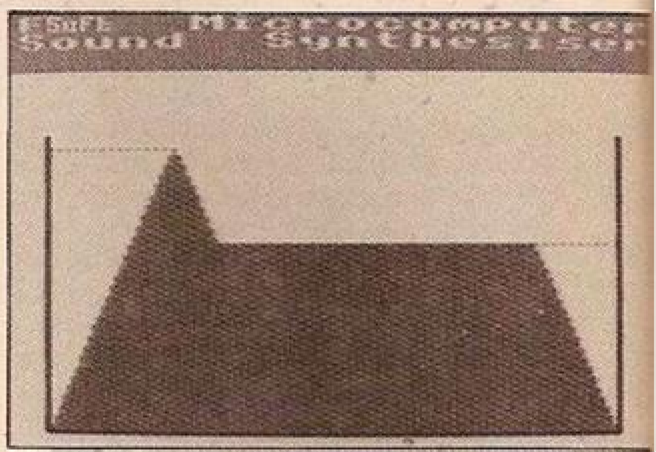
An interesting looking package which was still in a pre-production form as *Your Computer* went to press is Commodore's own **Sound Studio** — £14.95. This includes a synthesiser section which allows the user to create sounds and to use them in compositions, and a "multi-track recording studio" which allows music to be recorded in real time from the Qwerty keyboard or from an external MIDI keyboard.

The MIDI option looks particularly promising as Commodore — in association with the music publisher Music Sales — is planning to market a MIDI interface costing around £20. This compares with prices ranging from £80 upwards for existing MIDI interfaces.

Admittedly, the Commodore interface will be a fairly basic affair without some of the facilities offered by the interfaces aimed at the professional musician, but it should be more than adequate for the computer enthusiast exploring MIDI for the first time.

One existing Commodore peripheral that can be used with the Sound Studio package is the miniature £19.99 **Music Maker** keyboard which clips onto the 64's qwerty keyboard to convert it into a two-octave musical keyboard. More than 185,000 of these have been sold, so there must be some Commodore owners interested in making music with their machines!





Above: Siel CMM25; Right: screen shot of FSoft Music Maker; Below: Sequential Music Mate.

A similar, but flimsier, clip-on keyboard is made by the Italian Siel company whose main line of business is making synthesisers. The company is also becoming an important force in the musical micro world. In addition to the clip-on keyboard, Siel also produces a separate full-size, four-octave keyboard for the Commodore 64. Both the miniature **CMM 25** — £19.99 — and the stand-alone **CMK 49** — £125 — keyboards are provided with software on tape or disc to fiddle with the SID chip.

The larger keyboard also offers the option of expanding to MIDI control by adding a £87.95 interface. What it doesn't do is provide any method of storing music either while you play, or as notes on a stave. Future software updates may change this, but at the moment the CMK 49 is only suitable for real-time music playing.

Another synthesiser maker, the American Sequential Circuits company, does offer the possibility of musical storage with its **MusicMate** add-on keyboard and **MusicWare** software for the Commodore 64. The £99 MusicMate is just 2½ octaves long and comes with a disc-based program which allows you to control the SID device using one of eight pre-programmed sounds. Some very basic modification of these sounds is possible.

To be more adventurous with the MusicMate you have to invest in one or more of the additional MusicWare packages retailing at £34.95 each. These include a Sound Maker package to meddle with the SID parameters, a Song Builder package — called, confusingly, Song Recorder in its instruction booklet — for recording music played on the keyboard, a Song Editor which converts the music into conventional notation which can then be edited, and a Song Printer, which does as it says.

All of these packages perform adequately but as each one costs the same as Island Logic's Advanced Music System, they can hardly be recommended as being good value. The Sequential system has no provision for MIDI which is strange for a product from a synthesiser manufacturer, especially as Sequential was the original driving force behind MIDI.

Another Commodore keyboard add-on is LVL's **Echo 1,** a £100 three-octave device which comes with a piece of software called Organ Master providing several preset sounds for your delectation. A version of the LVL keyboard for the BBC computer is also available.

Finally, for the Commodore 64, there is the £149 **Microsound 64** keyboard and software package. In its basic form this is another SID-controlling keyboard but, as we shall see next month, it has a rather impressive trick up its sleeve.

The Microsound provides the user with more control over the SID parameters than Siel's MK49 or the basic Sequential MusicMaker packages. It also provides a sequencer which will store up to 200 notes for each of the 64's three voices.

It is not a real-time recorder but a "step time"



sequencer which accepts only pitch information from the musical keyboard and assigns the note a fixed length, independent of the timing of the keyboard playing. The music stored in this way can be edited but tends to sound rather lifeless on replay.

Next to the musical keys are two slider controls that can be assigned by the user to control various SID parameters, such as the filter cut-off point and pulse width, as the keyboard is being played. A useful addition.

The only other home micro to have dedicated musical keyboard add-ons is the BBC and the choice here is far more limited than for the Commodore 64. Other than the LVL Echo mentioned above there is only one keyboard designed to work with the BBC micro's internal sound-making device. This is ATPL's £125 **Symphony** keyboard, another four-octave affair supplied with software to drive the BBC sound chip. Up to 100 different sounds can be defined, manipulated and then played from the keyboard.

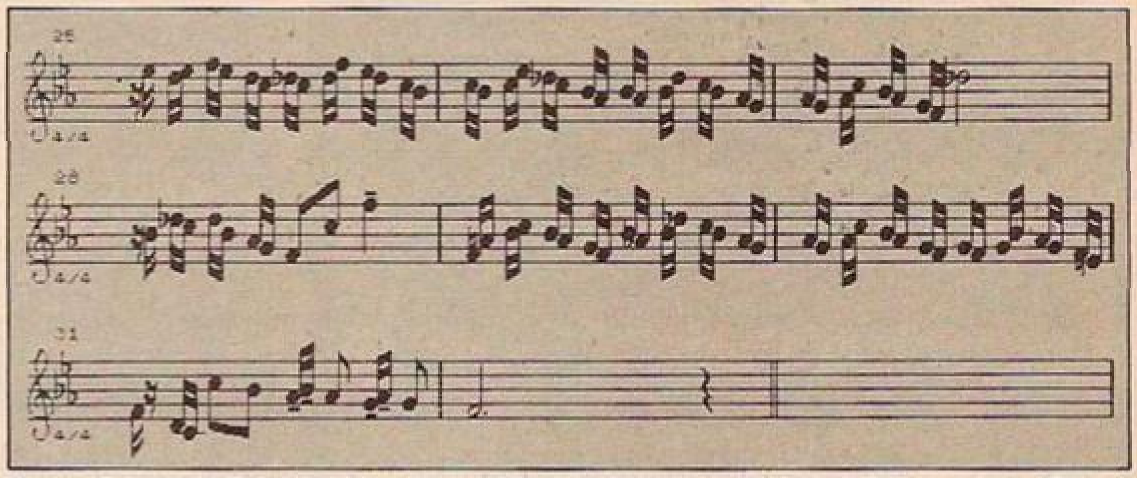
The Symphony package does not include any provision for sequencing or recording or for MIDI connections. But it does offer an escape path from the limitations of the BBC sound chip. This takes the form of an additional £11.50 piece of software which will allow the keyboard to drive the Acorn Music 500 synthesiser.

The £199 **Music 500** was introduced as an add-on for the BBC about a year ago. In hardware terms it offers a powerful and versatile 16-channel sound synthesiser with a stereo output. Equally important is the software used to drive the synthesiser.

The developers of the Music 500, Hybrid Technology of Cambridge, have produced a new language called Ample especially tailored for music-making. Ample is similar to Logo or Forth in that it uses structures called "words" to define sounds, to generate these sound, and to create new musical notations. Once a word has been defined it can be incorporated in other, more complex, words.

This might sound complicated but, on the whole, it isn't. It allows complex, multi-part tunes to be defined with relative ease. Defining sounds is a bit more complicated and involves a lot of trial and error especially as no graphical assistance is given. However, a useful selection of preset sounds is supplied with the Music 500.

The 16 sound channels, usually configured as eight voices, can be placed at any of seven stereo positions to provide an impressive spread of sound. Ample is multi-tasking to allow these voices to be heard individually or together.



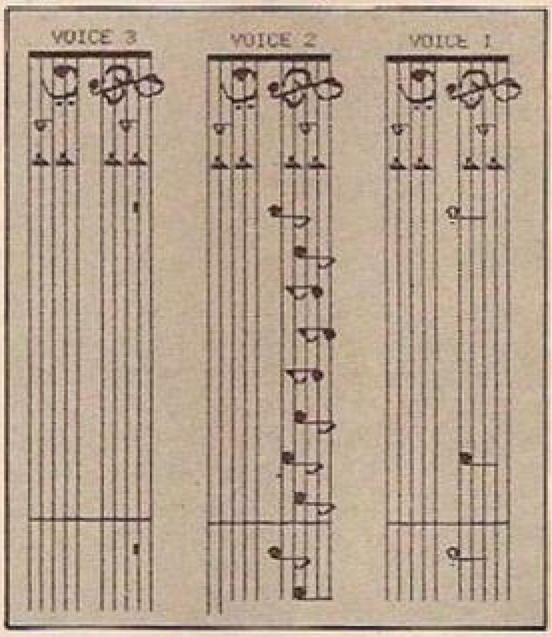
Above: Romantic Robot's Music Typewriter on a Spectrum printed on Epson printer. Below: Island Logic's The Music System on a CBM-64 printed on Commodore MPS801 printer.

Hybrid Technology have continued to develop the system since its launch and are about to produce a clutch of add-ons and modifications. Central to these is a Rom version of Ample called Nucleus which extends the language and supports new peripherals. One of these is a £129 MIDI interface that will allow Ample programs to control external synthesisers or will allow these synthesisers to drive the Music 500 sound module.

Another new peripheral is a £129 four-octave keyboard. Notes played on this device can be transcribed automatically into Ample scores.

Another planned add-on is an £89 stereo amplifier designed to complement the rest of the Music 500 system. Like the MIDI interface and the original synthesiser, it is built into a disc drive case.

These additions should greatly extend the scope of the Music 500 system. In its basic format, it is primarily a computer programmer's plaything without the sort of immediate real-time feedback that the musician usually needs. The MIDI and keyboard options will change that.



If you want to hear the types of sound that the Music 500 can produce, Hybrid Technology have produced a 40 minute cassette of music generated on the system. The tape is available from Hybrid for £1.95.

An exciting prospect for Commodore 64 users is that Hybrid plans to produce a version of the Music 500 for the 64 early in 1986.

Although the Music 500 has the market for BBC add-on synthesisers almost to itself, it will have to face strong, and growing, competition from other synthesiser add-ons for the Commodore 64, as we shall see in a moment.

The only competition at present in the BBC market comes from Clef Products of Cheshire with their **Programmable Digital Sound Generator** (PDSG) costing £495. This may seem expensive but it comes complete with a five octave keyboard that senses how hard you are hitting the notes and uses this information to alter the synthesiser output. This facility is normally only available on synthesisers costing £700 or more.

Commodore 64 owners can enter the world of the add-on synthesiser module — known in synthesiser lingo as an "expander" — for a more modest £99.95. That is the asking price for a hardware and software package just launched by Siel. Called the **Sound Buggy**, this package includes a box of tricks which provides automatic rhythm and bass accompaniments for simple tunes picked out by the player.

Commodore itself is producing a sound module for the 64, also expected to sell at around £100. A matching full-size, four-octave keyboard will be available at £49.99. Details were sketchy as *Your Computer* went to press but the expander appears to be an eight-voice module with sophisticated automatic accompaniment facilities.

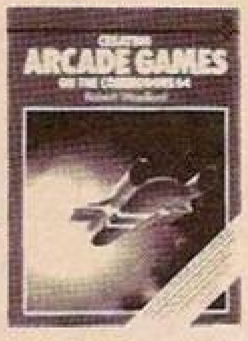
It is said to produce sounds of comparable quality to those of Yamaha's DX FM synthesiser series and will be able to interface with MIDI instruments. If it does live up to these claims, it could be a very impressive little beast.

And finally, on the expander front, a ray of hope for a select group: music-loving MSX owners who do not have a Yamaha machine. Toshiba is planning to launch an add-on keyboard and expander for MSX machines which, in some ways, seems similar to the Sound Buggy. It will offer 60 preset instrument sounds, 20 rhythm patterns, automatic bass and chord accompaniments, and something called a "harp sensor". ■

CONCLUSIONS

- There is a lot of software and hardware designed to turn home micros into music-making machines, but the best packages are limited to the BBC and Commodore 64 machines.
- For the musically-inclined BBC owner, Island Logic's The Music System has no equal for getting the most out of the machine.
- There are no cheap ways of bringing outside sound sources under the control of the BBC. But the Music 500 system does provide a flexible and challenging means of widening your musical horizons, providing you are prepared to persevere with Ample and can manage without graphical aids or conventional music notation. The rather costly new MIDI module will increase the system's versatility.
- For the Commodore owner, the choice is more difficult. Island's TMS is probably the best package if you are seriously interested in music or are thinking of moving into MIDI; Activision's Music Studio is more fun. Commodore's Sound Studio could pose a strong challenge.
- If you are looking for a musical keyboard, Commodore's sub-£50 device appears to offer extremely good value for money and could form a powerful package with the company's £100 sound expander.
- MSX owners should keep an eye open for Toshiba's expander and keyboard.
- For owners of Amstrad and Spectrum computers there is the option of expanding musically via a MIDI interface.

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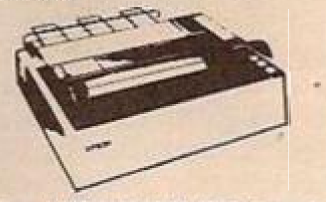
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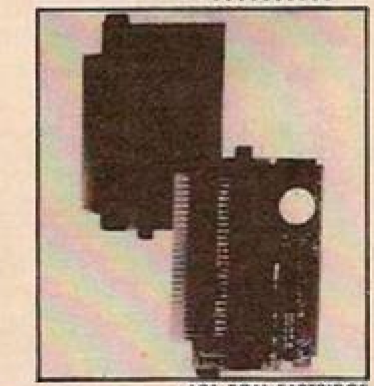
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BEYOND'S SU

Paul Bond with the view from Beyond.

"If you meet Manuel he'll teach you how to use a machine pistol". No, Beyond's mild-mannered marketing manager Clive Bailey isn't fomenting urban revolution down there in the Farringdon Road, but explaining how to free your friend from the clutches of an evil drug syndicate based in Colombia. Nexus is not just a game, it is also a software development house and a new marketing concept. As any mafioso knows, a successful operation spawns many front organisations. Beyond's new labels are Nexus and Monolith.

"Beyond is more orientated towards innovative action/strategy type programs," says Clive Bailey. An apt description — although backed by EMAP Publishing, Beyond wouldn't be where they are today without strong products like Lords of Midnight, Doomdark's Revenge, Psytron and Psi Warrior.

Monolith is seen as being sophisticated, too, with more elements of arcade/shoot'em-up action. But there's more to Beyond's subdivision than mere aesthetics: "A lot of retailers look at various catalogues and say to themselves: 'Okay I'll have, like, three Beyond products, three Ocean, three US Gold, three something else. It just enables us to put more products on the market." Making their debut on the Monolith label are Rockford's Riot (reviewed in Your Computer Software Shortlist in September) and Quake Minus One, of which more later.

And Nexus? "It's going to be like the National Aeronautics and Space Administration," says Clive Bailey, "with the same corporate/authoritative/scientific image as NASA, but not too high a profile — just when a new project is being announced."

Nexus the program was written by Psi Warrior/Psytron veterans Paul Voysey and Tayo Olowu. "We always wanted to set up our own company" says Tayo Olowu. "The development house is still just us at the moment, but we will be getting other programmers in, working almost over a modem."

In Nexus for the CBM-64 you are an investigative reporter trailing a buddy who has disappeared on assignment in Colombia. Here you contact Nexus — a dissident group determined to break the ring from inside.

The screen shows a sideview of a corridor at the top with a central control display. By moving the joystick in various directions you can walk, run and punch. You can even do Exploding Fist style flying kicks. The move selected is displayed in the panel, and executed when you push the fire-button.

"There are two things I don't like in computer games," says Tayo Olowu, "I don't like lives and I don't like giving points." Apart from rescuing your friend, you must gather evidence of the complex's activities and transmit this back to your editor from one of the several transmission rooms. These rooms get more heavily guarded as the game progresses and your success grows.

Some of the gadgets strapped around your person include a tape recorder which enables you to record messages printed out at the base of the screen plus a camera for photographing documents and key personnel. To increase your skills within the game you must co-operate with members of Nexus who will train you in explosives, fire-arms, unarmed combat, forging, knife-throwing, gymnastics, lock-picking and so on. This is done by arranging a rendezvous in a training room where the joystick controls are explained to you.

Tayo and Paul learned from their experiences with Psytron and Psi Warrior — "Psytron was involved and you had to read a manual — a game like Nexus would warrant a huge manual — I like being able to pick up a joystick and play. All the information you want is fed to you when you need it." The game is to be marketed in a special plastic container with a minimum of printed instructions. "What I look for in a game", says Paul Voysey "is playability — something like Boulderdash as a target — and originality, that you're not playing just another version of Jet Set Willy. The game should have depth in the way that adventure games have depth. You should feel that you are somewhere and that all your actions are important."

And what could be more important than freeing the fair land of Elindor from the evil king Sorderon's Shadow? In this program, written by Nick Eatock and Simon Welland, for Beyond, you are guided by the people who summon you to Elindor. They tell you which tasks to complete next, in a series of about nine major and five minor quests. So this is a game which would be in tune with the pick-up'n play philosophy of Nexus.

"We just had it at the landscaping stage, with some clouds and a scrolling sun and moon," explained Nick Eatock. More adventure-orientated than the primarily strategic Midnight series, Sorderon's Shadow features a high degree of characterisation and graphics. "We used a sort of line-drawing system like that in the Spectrum's Rom — Mike Singleton got his data in 17K, we got ours in about eight."

"I was very impressed by it — it's got a bit more variety" said midnight supremo Mike Singleton. "And the way that they presented it to Beyond, landscaping first, was pretty much the way I came up with Lords of Midnight." And that, funnily enough, was also the way in which

BOUNCES



This Viking can take a lot of punishment — he needs to in Bounces, programmed by Denton Designs for Beyond.

NEXUS



With a Protek digitiser and a standard video camera, Paul Voysey and Tayo Olowu were able to achieve some fascinating effects. Beyond advertising manager and karate expert Francis Lee (no relation) modelled the flying kicks. Nexus will be available from Nexus on the Spectrum and Commodore for £9.95.

ENIGMAFORCE



Enigmaforce is the sequel to Shadowfire but a very different type of game. This is a provisional development sketch of one of the characters in the game.

JPERSECRETS

Mike's new game Quake Minus One came into being. "I thought it would be interesting to animate a landscape. Once I'd got it, I had to use it."

Co-written with Warren Foulkes, the futuristic game differs from the Tolkienesque Lords of Midnight in all other respects. In Quake, the Robot Liberation Front demand freedom of thought and association for droids. They seize control of the Titan Undersea Power Station and hold humanity to ransom. You seize control of one of the complex's computers and its fleet of armed mobiles. You must capture or destroy the remaining Titan computers. It's an enterprising blend of arcade action and strategic thinking.

Each of the four enemy computers has a particular defence function. To locate them and travel to them you can call up either a stylised three-dimensional map of the complex, or a through-the-gunslit of the local landscape. Zeus computer is the overall co-ordinating machine, the others deal with attack, defence and counter-attack. So if you destroy the attack computer, Ares, for example, you won't encounter so many heavy attacks. If you destroy Zeus, it is more difficult for the enemy to think ahead and stop you from achieving your goals. So there are a number of strategies open to you.

Midnight fans (or "frothers" in Beyond jargon) may want to know about the delayed third part of the trilogy, Eye of the Moon. It involves a much larger area, 12 different countries, and much more individualisation of landscape — every tree will look different, for example. Morkin has gone south to find the Eye of the Moon, which will enable him to see into the future. He encounters various evil influences in the Bloodmarch, but this game can be played with two sets of goodies against the evil. Morkin's son by Shareth the Heartstealer turns up to lend a hand.

Also lending a hand frequently to Beyond are the ubiquitous Liverpool design house Denton Designs. They helped smarten up Sorderon's Shadow by putting representations of characters at the base of the screen, but they have two full-blooded games in their own right for Beyond: Enigmaforce, the follow-up to Shadowfire; and Bounces, which was developed under the working title of Iron Heroes.

"We've tried to avoid the Ultimate trap", says Steve Cain of Enigmaforce. "The follow-up has some of the feel of the original game — the lower part of the screen is similar — but the top section is quite different, there are characters moving against a background."

In Enigmaforce four of the Shadowfire characters, Zark, Sylk, Maul and the fair Sevrina crash-land along with the evil Zoff on Sylk's home planet. Two armies are locked in battle on the planet's surface; Sylk's people are fighting a pro-Zoff force. Zoff escapes into an underground complex to link up with his allies. The aim of the game is to stop Zoff, take him alive — you can kill him in this game, but it's inadvisable because he's got the key to the spaceship and you need him as a hostage to get by the hostile soldiers.

Even more zappy is Denton's cathartic little number called Bounces, based on an imaginary sport of the future that enables the peace-loving people of the world to let off steam by hiring a champion to fight a particular violent form of pelota for them.

"Sort of state-of-the-art bat-and-ball", says modest Steve Cain. The two champions face each other and try to bounce balls through a hole in the ceiling. But when these guys get going they make McEnroe look prim. No holds barred stuff this, even for the lady combatants. The idea is to store six or seven different combatants on tape, so that the player can pick the one he or she identifies with — each has his or her own characteristics.

A man who took a computer program and turned it into a software house is Fernando Herrara. This could only happen in America, which is where Fernando founded First Star Software after Atari awarded him $25,000 in a software competition. He wrote an alphabet program for his son. Close questioning revealed another South American connection for Beyond — not only is the Nexus game set in Colombia, but this is where Superman game programmer Fernando was born.

Since a big Superman image would consume too much memory, and a small one would be reminiscent of the relatively primitive Atari Superman game, First Star compromised and produced "intermission" or transition sequences which allow the player to see Superman in close up, as well as the main sequence involving the confrontation between Superman and the evil super-alien, Darkseid. Darkseid, who is growing in popularity in the USA — "he represents all the evil things in us that we try to control" — comes to earth seeking the anti-life formula hidden in the brain of one human on earth. This will give him total mental control over every being in the universe. It's Superman's job to conduct the hapless humans away from Darkseid's evil influence. Moving from screen to screen entails fighting out one of the large-size transmission sequences. Darkseid's Omega ray can kill or teleport people. Superman uses a giant mirror to deflect it. As Superman flies between the city blocks of Metropolis, Darkseid hurls chunks of kryptonite at him. So continues the endless struggle between good and evil.

This struggle is also to be found in the other First Star game which Beyond are releasing in the UK — the follow-up to Spy V Spy, The Island Caper (see page 35). ■

ISLAND CAPER



This First Star game from the States is the follow-up to Spy v Spy. This time you have to assemble a rocket and sneak off the island in a submarine — or else be engulfed in a volcanic eruption. Written by Mike Riedel, it's for one or two players playing simultaneously. The bottom half of the screen shows the black spy, either friend or computer.

SORDERON'S SHADOW



Written by Nick Eatock and Simon Welland, they make no bones about its Lords of Midnight look. At £9.95 on the Beyond label this will doubtless be snapped up.

QUAKE MINUS ONE



Revolt of the robots. Time is ticking away until they destroy a major power station endangering human life on the planet earth. Written by Mike Singleton of Lords of Midnight fame, together with Warren Foulkes (together they pioneered the first play-by mail computer game in this country, Star Lord) this will make its appearance on the Monolith label at £9.95.

IN THE CROWN of thorns that is the U.K. microcomputer industry, one jewel shines out — Amstrad. While the boffins at Sinclair Research and Acorn have been scratching their egg-heads trying to make ends meet, Amstrad's barrow boys have been out touting their wares. In little more than a year Alan Sugar's Amstrad has unleashed four new machines into a market that others said was saturated.

Unlike Sugar's first three micros, the new PCW 8256 is not so much a home computer as a home word processor. A sensible move for this fast-moving computer manufacturer when you realise that, after playing games, the next most popular use of computers is word-processing.

Amstrad claims it is a complete word processor for less than the price of a typewriter. At £399 plus VAT — £460 take home — there are not many competing typewriters or micros. In one package there is: a proper micro, a decent green screen monitor, a built-in floppy disc drive, dot-matrix printer and word-processing software.

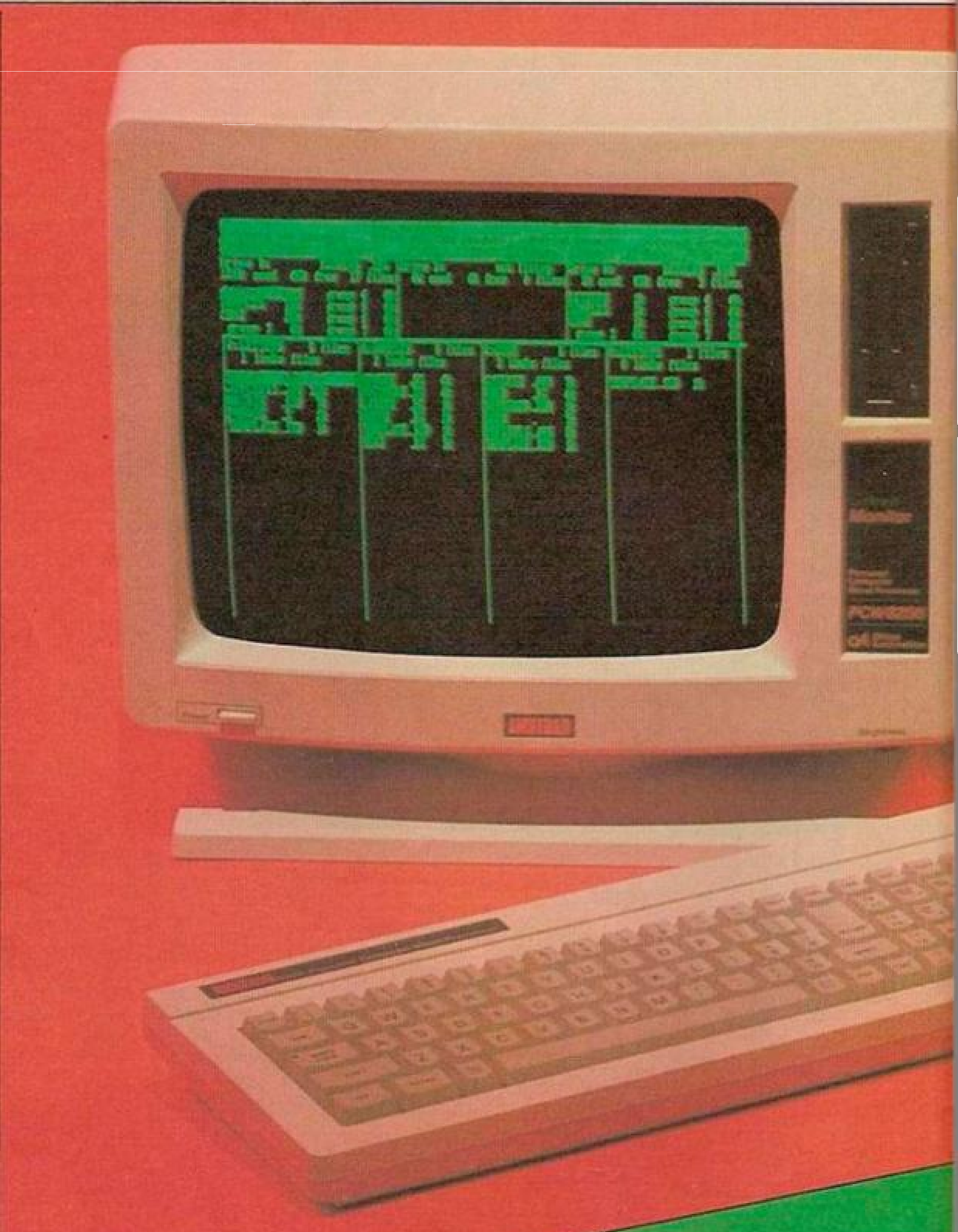
Although the PCW 8256 is related to the rest of the Amstrad family, it is not merely a souped-up CPC 6128. That machine is an up-market toy with small business pretentions. This is the kind of system which could sit on a business-person's desk, and look at home.

It takes about five minutes to unpack the huge fridge-sized box that contains the system, connect up the components, put on a plug and get the machine going. Although the package comprises a number of elements, there is only one plug for the whole system. This makes life simpler and safer because power leads and multiple plugs trailing all over a room can be downright dangerous.

The two rather hefty manuals that come with the system are hardly light reading. Most aspects of the computer are covered and they tend to be exhausting, as well as exhaustive. There are complete sections on the word processor, CP/M, Basic and Logo. A simple little starter leaflet outlining the main word processor commands would be useful.

One lead trails from the main system unit to the keyboard, and a second lead, together with a ribbon cable, connects the printer to the rest of the system — all very straightforward. There is only one other port; it sits on the rear of the main unit and is a non-standard general expansion bus. It combines serial and parallel interfaces and can be used for modems, networks and so on.

Of all the links in the PCW chain, the weakest is probably the keyboard which is not up to BBC standard. True, it has 82 keys including an integral numeric keypad, but it is





Left to right: Apricot-style keyboard; non-standard expansion port; near-letter-quality printer; Macintosh-style built-in drive in monitor; spot the enter key; green screen.

WORD CHAMPION?

AMSTRAD PCW 8256

Not £2,000, not £1,000 no not even £500. This complete word processor is just £460. Reviewed by Bill Bennett.





not very easy to use. Not all the 82 keys are in sensible places; for example the Enter key is no larger than the others and sits in the bottom right corner. Many of the keys provide a variety of different characters. This is not really a problem, but users will take time to learn about the machine.

Four function keys sit in the middle of the keyboard — doubling up to eight with Shift. Like the keyboards with the Sinclair QL and the Apricot F1e, the Amstrad keyboard is disturbingly lightweight, which may not worry most users, but will cause problems for users brought up with typewriters. It is moulded from the same grey plastic as the rest of the system, which looks like a proper business computer rather than a toy.

Being primarily a business tool, there is little need for a full colour screen on the PCW 8256. After all, there is not much 8-bit business software that makes use of it. Not only that, but a colour monitor would add greatly to the cost. Green screens can be kinder on the eyes than a blaze of colour.

The screen is larger than usual — about 13 inches diagonally, and capable of displaying more information. It has 90 columns by 32 lines of text, compared with the usual 80 x 24 or less. Because the screen is slightly curved lines can appear bent, and characters distorted. Even so they are much easier to read than on a TV, and at least as good as those on any other green screen monitor. Under the screen is a knob for adjusting the screen brightness.

Maybe the best individual feature of the system is the printer. It is smaller than most dot matrix printers — a simple, unfussy unit, which accepts sheet-fed paper with an optional tractor feed for use with continuous stationery. Given decent paper, the results can be stupendous.

It is a NLQ, or near-letter-quality printer, though it is capable of printing in two modes; draft and high quality. Draft mode is relatively quick, at a claimed 90 characters per second,

(continued on next page)

THE 8256'S BUNDLED SOFTWARE

THESE DAYS, when someone considers buying a computer, one of the most important factors to consider is the bundled software. The PCW 8256 comes with a complete word-processing package that contains its own operating system, together with a copy of Digital Research's CP/M Plus. Also included in the price of the system is a version of Basic and DR Logo as well as GSX.

CP/M Plus means that software developed for any other CP/M micro will, in theory, run on the Amstrad. That is the theory. However, in practice software developed for one CP/M machine will not necessarily run on another for a number of reasons, to do with the differing specifications of machines. For the most part this is not a problem with the Amstrad as it exceeds the usual CP/M specification. This means that while most CP/M software will run on the machine, it might not make full use of the machine's features, particularly the extra-wide screen and the large memory.



One problem that the Amstrad PCW has in relation to CP/M is that the micro uses a non-standard disc format. Apart from Amstrad, no manufacturer of significance uses 3in. discs with CP/M, and those that do use a different format. So the only CP/M software that you will actually be able to use with the machine is that which has been specially converted to the Amstrad format. Fortunately Amsoft has tied up a deal with a software distributor to make CP/M software available for all Amstrad machines via mail order. Among the packages on offer are: SuperCalc, dBase II and the Touch 'n Go typing tutor.

The actual implementation is CP/M Plus, which makes use of the extra memory by bank switching. GSX is a graphics system, the forerunner of Digital Research's GEM environment, which is available on the new Atari 520 ST.

Amstrad Basic is also included with the machine. It is more or less the same as the implementation on the other Amstrad micros; similar in many respects to BBC Basic. To help business users who want to develop their own applications software there are a number of extra features such as record management and double precision arithmetic. As well as Basic there is DR Logo, which is not really a language for business users. Maybe it is a clue that this machine is also intended for the educational market.

(continued from previous page)

it is good enough for most printing needs, and even in this mode is vastly superior to the Commodore 64 printer or a standard Seikosha.

High-quality printing is slower — after all each line needs to be printed twice with the print head displaced slightly. Even so, at 20 characters per second it provides copy that is good enough for even the most demanding recipient. Printing can be a little noisy, but not offensive.

Sitting next to the screen in the main unit is the computer's single disc-drive. Like other Amstrads, the PCW uses 3in. disc drives. These discs are double sided. Each side stores 180K, comparing well with the 100K stored on a 5.25in. disc by the Commodore 64, though other machines cram many more bytes onto a floppy. Amstrad's discs seem far more reliable than the Commodore units, or Sinclair's microdrives.

The discs work well. They make a bit of noise, and the LED flashes on and off a bit, but they do the business. However, the individual discs are expensive — about £4 each — and difficult to find in the shops. Also, if you are getting down to serious work on the machine, turning a disc over is annoying.

One innovative feature of this machine is the Ram disc — new to this part of the computer market. It is an area of Ram which acts like a floppy disc as far as the user is concerned. But a Ram disc is far faster than any floppy; data and files are whisked in and out at breakneck speeds.

In addition to the large memory, and the familiar Z80A processor, there are a couple of specially designed microprocessors to control the printer and the keyboard. The PCW 8256 can be used as an intelligent terminal on a multi-user network, maybe not something that many *Your Computer* users will be doing, but still a useful facility.

This machine is definitely a serious business tool — at the price of a toy computer. And it certainly makes most of the competition look silly; for the same price you could buy a BBC B Plus, with only 64K of Ram, no monitor, no disc drive, no printer and no word processing software. An equivalent system based on the Beeb would set you back a cool thousand or so. You simply could not build a comparable system based on the Commodore 64 — the discs are too slow, the memory too small, and the screen unable to display 80 characters, let alone the 90 the Amstrad boasts.

Sinclair's troubled QL fares better in comparison now its price has dropped to £199. Add extra Ram, a monitor, and a decent printer, make do with the Microdrive and Psion's Quill and you could have something approaching the PCW for around £750.

Higher up the computer league table machines like the Apricot F1e and the cheapo IBM compatibles begin to compete on specification, but not on price. These machines represent the territory where Amstrad's new baby will make its greatest impact.

Despite the PCW's pedigree, it is not really a games machine. Doubtless some backstreet entrepreneur is currently planning to release "Revenge of the Drunken Pac Invaders" for the machine, but thanks to its specification, this is not really a suitable machine for the average arcadian. However, there may be an adventure game or two converted from another CP/M format for the machine.

CONCLUSIONS

- PCW is an important breakthrough, being a complete, ready to run business system for the price of a home computer. Purchasing the component parts of the system individually would be very expensive.
- However, home computer fans will be disappointed with its lack of games playing features — no colour and little sound.
- The computer is excellent, with plenty of memory for every application. The disc drive and monitor would be adequate on a system far more expensive than this. A software bundle like that included on the PCW would have cost around £400 a year or so ago and the quality of print from the printer is incredible.
- Rival machines are few and far between, and although the PCW 8256 is really a business tool, it would also make an ideal machine for the fanatical programmer. This is especially so if you consider the excellent range of development software available for CP/M.
- With the inclusion of DR Logo and a network option, the PCW 8256 would also be an excellent micro for the educational user. It would teach pupils far more about the computerised work environment than a BBC micro.

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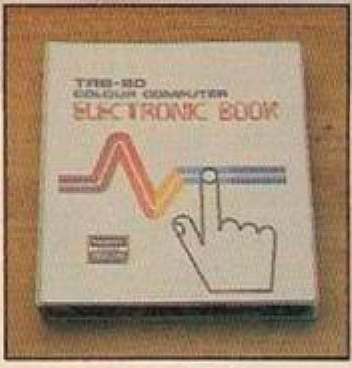
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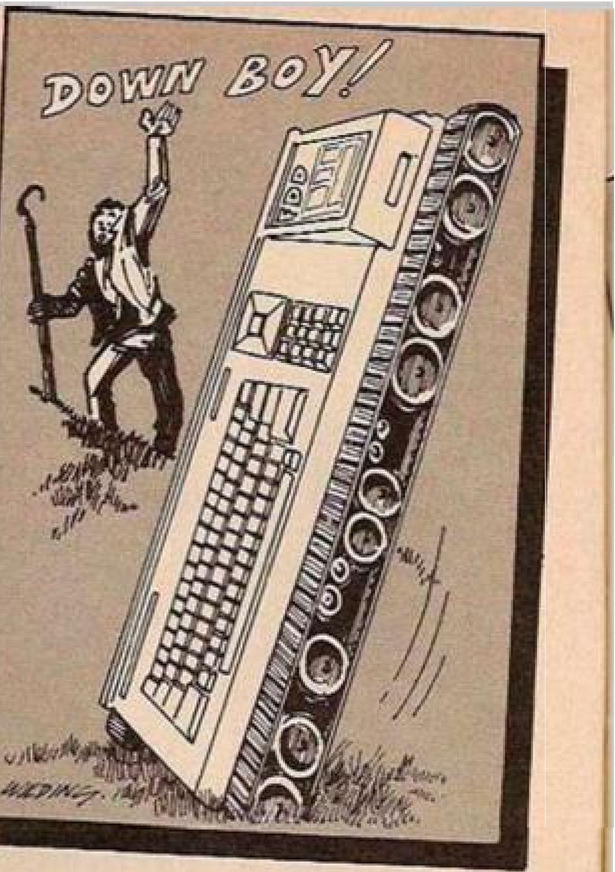


Table 1. The new commands.

I CAPSON	Turns capitals lock on.
I CAPSOFF	Turns capitals lock off.
I SHON	Turns shift lock on.
I SHOFF	Turns shift lock off.
I MOTORON	Turns on cassette motor.
I MOTOROFF	Turns off cassette motor.
I RESET	Resets paper pen and colours to those at switch on. (Handy if you get in a muddle.)
I RESKEY	Resets the key definitions to normal.
I LIST	List all the new commands to jog your memory.
I FASTSAVE	After this command all saves are made at approx 400 Baud. to revert to normal use the seed write command.
I FLUSH	This flushes the keyboard buffer.
I HEADER	This will read the first header it comes to on a cassette and displays all the relevant info.
I :DEC,n	This command will give the decimal value of any Hex or binary number up to the value of 65536. n=number to be converted.
I GRPEN,n	Sets graphics pen colour where n=colour.
I GRPAPER,n	Sets graphics paper colour where n=colour. Both of these are very useful when using the Tag facility.
I KEY,@A%	Waits until a key is pressed then returns the ABC value in A%. (Although A% is used as an example any variable can be used as long as it has been previously defined in your program. Note the @ symbol before the variable, this must not be ommitted).
I CHAR,s,x,g,@A%	Returns the ASC value of the character at position x,y in A%. s=Stream number. x=Position across. y=position down. (For explanation of A% see I Key.)
I DOKE,m,n	This is a 16 bit version of Poke that allows numbers up to 65535 to be poked into two bytes instead of the normal one. m=Location to be poked. n=Number.
I DEEK,n,@A%	As for I Doke but a 16 bit version of Peek. n=Location. (For A% see I Key.)
GRID,n	If you are using a DMP1 printer, this will print out grids for you to use when planning screen layouts. The grids are similar to those on pages 1,2 and 3 in Appendix 6 of the User Guide. n=Either 20,40 or 80.
I LOOK,n	Prints out a section of memory starting at location n in sections of 200 bytes. Output can be sent to either the screen or printer. (Follow prompt.) Press large Enter to return to Basic or any other key for the next 200 bytes. (Best used in Mode 2.)

AMSTRAD BASIC is very fast and versatile but does lack one or two useful commands.

If the Basic program is entered and run, the code that is generated will add 21 new commands to Amstrad Basic that can be used from within your own Basic programs or as direct commands.

The new commands are logged on via the excellent RSX capability of the Amstrad. This allows machine-code routines to be called by names rather than using the unfriendly Call command. All new words must be preceded with the I symbol — shifted @. The code generated by the Basic program can be reloaded into memory with:

MEMORY 39999:LOAD "RSK.BIN":CALL 40000: CLOSEIN

The call to 40000 is needed to log on the new commands.

AMSTRAD EXTRA POWER

Michael Mostowyj expands the Amstrad's vocabulary.

```
60 MEMORY 39999:RESTORE 230
70 DEF FNx=VAL("&"+A$)
80 sum=0
90 MODE 1:PRINT"PLEASE WAIT!!
100 FOR n=40000 TO 41320
110 READ A$:POKE n,FNx
120 sum=sum+FNx
130 NEXT
140 IF sum<>137942 THEN PRINT"ERROR IN DATA. PLEASE CHECK!!":END
150 CLS:PRINT"PLEASE INSERT TAPE TO SAVE BYTES."
160 SAVE "RSX.BIN",B,40000,1321
170 END
180 '**************************************************************
190 '** TO RELOAD THE CODE USE EITHER AS A DIRECT COMMAND, OR AS THE FIRST
200 '** LINE OF YOUR OWN PROGRAM:
210 '** MEMORY 39999:LOAD"RSX.BIN":CALL 40000:CLOSEIN
220 '**************************************************************
230 DATA 01,53,9C,21,4F,9C,CD,D1,BC,3E,00,32,5C,A1,C9,00,00,00,00,94,9C,C3
240 DATA 84,9F,C3,06,9D,C3,0C,9D,C3,10,9D,C3,16,9D,C3,22,9D,C3,25,9D,C3,28
250 DATA 9D,C3,2E,9D,C3,37,9D,C3,40,9D,C3,03,9D,C3,49,9D,C3,6E,9D,C3,83,9D
260 DATA C3,9D,9D,C3,C4,9D,C3,1A,9D,C3,A9,9D,C3,1F,9E,C3,DA,9E,4C,4F,4F,CB
270 DATA 43,41,50,53,4F,CE,43,41,50,53,4F,46,C6,53,48,4F,CE,53,48,4F,46,C6
280 DATA 4D,4F,54,4F,52,4F,CE,4D,4F,54,4F,52,4F,46,C6,46,4C,55,53,C8,47,52
290 DATA 50,45,CE,47,52,50,41,50,45,D2,52,45,53,45,D4,52,45,53,4B,45,D9,43
300 DATA 48,41,D2,44,4F,4B,C5,44,45,45,CB,4B,45,D9,44,45,C3,46,41,53,54,53
310 DATA 41,56,C5,4C,49,53,D4,48,45,41,44,45,D2,47,52,49,C4,00,FF,C3,00,BB
320 DATA 3E,FF,32,E8,B4,C9,3E,00,18,F8,3E,FF,32,E7,B4,C9,3E,00,18,F8,21,5F
330 DATA 00,3E,05,C3,68,BC,C3,6E,BC,C3,71,BC,CD,09,BB,38,FB,C9,FE,01,C2,5D
340 DATA A1,7B,C3,DE,BB,FE,01,C2,5D,A1,7B,C3,E4,BB,CD,02,BC,CD,4E,BB,C3,6C
350 DATA BB,FE,04,C2,5D,A1,DD,5E,00,DD,56,01,D5,DD,7E,06,CD,B4,BB,DD,66,04
360 DATA DD,6E,02,CD,75,BB,CD,60,BB,E1,77,3E,00,C3,B4,BB,FE,02,C2,5D,A1,DD
370 DATA 5E,00,DD,56,01,DD,6E,02,DD,66,03,73,23,72,C9,FE,02,C2,5D,A1,DD,5E
380 DATA 00,DD,56,01,DD,6E,02,DD,66,03,D5,5E,23,56,E1,73,23,72,C9,FE,01,C2
390 DATA 5D,A1,D5,CD,18,BB,E1,77,C9,21,94,9C,7E,FE,FF,C8,FE,5B,30,06,CD,5A
400 DATA BB,23,18,F2,D6,80,CD,5A,BB,CD,CF,9E,18,F3,FE,01,C2,5D,A1,EB,16,00
410 DATA 01,10,27,CD,EA,9D,01,E8,03,CD,EA,9D,01,64,00,CD,EA,9D,01,0A,00,CD
420 DATA EA,9D,7D,C6,30,C3,06,9E,1E,00,A7,ED,42,38,03,1C,18,F9,09,7B,B7,20
430 DATA 04,7A,B7,20,07,7B,C6,30,15,C3,06,9E,3E,20,F5,C5,D5,E5,47,3A,5C,A1
440 DATA B7,78,20,05,CD,5A,BB,18,03,CD,53,9F,E1,D1,C1,F1,C9,21,76,A0,CD,60
450 DATA A1,CD,18,BB,3E,2C,21,69,A1,11,40,00,CD,A1,BC,38,07,21,14,A1,CD,60
460 DATA A1,C9,21,2E,A1,CD,60,A1,3A,79,A1,C6,30,CD,5A,BB,CD,CF,9E,21,91,A0
470 DATA CD,60,A1,21,69,A1,CD,60,A1,CD,CF,9E,21,A3,A0,CD,60,A1,3A,7B,A1,47
480 DATA 4F,CB,00,CB,A0,CB,A8,CB,B0,CB,B8,CB,18,04,78,FE,05,38,05,21,27,A1
490 DATA 18,09,21,BB,A0,11,07,00,19,10,FD,06,07,7E,CD,5A,BB,23,10,F9,CB,41
500 DATA 28,06,21,B5,A0,CD,60,A1,CD,CF,9E,21,DE,A0,CD,60,A1,2A,7E,A1,CD,CA
510 DATA 9D,CD,CF,9E,21,02,A1,CD,60,A1,2A,81,A1,CD,CA,9D,CD,CF,9E,21,F0,A0
520 DATA CD,60,A1,2A,83,A1,7C,B5,28,03,CD,CA,9D,CD,CF,9E,C9,3E,0D,CD,06,9E
530 DATA 3E,0A,CD,06,9E,C9,7B,FE,14,20,05,21,19,A0,18,11,FE,28,20,05,21,31
540 DATA A0,18,08,FE,50,C2,5D,A1,21,49,A0,22,05,A0,3A,24,AC,32,09,A0,3E,FF
550 DATA 32,24,AC,06,14,C5,06,04,2A,05,A0,22,07,A0,C5,3E,0A,CD,53,9F,3E,0D
560 DATA CD,53,9F,06,19,2A,07,A0,C5,06,06,C5,7E,CD,53,9F,23,C1,10,F7,C1,10
570 DATA EE,11,61,A0,CD,49,9F,C1,22,07,A0,10,D5,C1,10,C9,11,0A,A0,CD,49,9F
580 DATA 3A,09,A0,32,24,AC,C9,1A,FE,FF,C8,CD,53,9F,13,18,F6,C5,D5,E5,47,CD
590 DATA 2B,BD,78,30,FA,E1,D1,C1,C9,7A,CD,6A,9F,7B,CD,6A,9F,C9,47,CB,3F,CB
600 DATA 3F,CB,3F,CB,3F,CD,79,9F,78,E6,0F,C6,30,FE,3A,38,02,C6,07,C3,06,9E
610 DATA FE,01,C2,5D,A1,D5,3E,00,32,5C,A1,CD,06,9D,21,40,A1,CD,60,A1,CD,18
620 DATA BB,FE,59,20,05,3E,01,32,5C,A1,D1,62,6B,06,19,C5,CD,CF,9E,54,5D,F5
630 DATA C5,D5,E5,CD,CA,9D,3E,20,CD,06,9E,E1,D1,C1,F1,CD,61,9F,06,08,C5,3E
640 DATA 20,CD,06,9E,5E,CD,65,9F,23,C1,10,F2,3A,5C,A1,B7,C2,F1,9F,3E,20,CD
650 DATA 06,9E,11,08,00,A7,ED,52,06,08,C5,7E,E5,CD,5D,BB,E1,23,C1,10,F5,C1
660 DATA 10,B5,CD,CF,9E,CD,18,BB,FE,0D,C2,A7,9F,3E,00,32,5C,A1,C9,00,00,00
670 DATA 00,00,0D,0A,1C,00,01,1C,00,01,1C,5F,01,0A,0D,0F,FF,1C,01,7F,1C,0D
680 DATA 01,1C,01,7F,1C,0D,00,1C,01,7F,1C,0D,00,1C,01,7F,1C,0D,00,1C,01,7F
690 DATA 1C,0D,01,1C,01,7F,1C,0D,00,1C,01,7F,1C,0D,01,1C,01,7F,1C,0D,00,1C
700 DATA 01,7F,1C,0D,01,1C,01,7F,1C,0D,01,1C,01,7F,1C,0D,01,1C,01,7F,1C,0D
710 DATA 01,1C,01,7F,FF,42,41,44,20,43,4F,4D,4D,41,4E,44,21,21,07,0D,0A,00
720 DATA 50,72,65,73,73,20,50,4C,41,59,20,74,68,65,6E,20,61,6E,79,20,6B,65
730 DATA 79,3A,0D,0A,00,46,49,4C,45,20,4E,41,4D,45,20,20,20,20,20,20,3A,20
740 DATA 00,46,49,4C,45,20,54,59,50,45,20,20,20,20,20,20,3A,20,00,20,20,20
750 DATA 50,52,4F,54,45,43,54,45,44,00,42,41,53,49,43,20,20,42,49,4E,41,52
760 DATA 59,20,53,43,52,45,45,4E,20,41,53,43,49,49,20,20,53,54,41,52,54,20
770 DATA 41,44,44,52,45,53,53,20,20,3A,20,00,45,4E,54,52,59,20,41,44,44,52
780 DATA 45,53,53,20,20,3A,20,00,4C,45,4E,47,54,48,20,4F,46,20,50,52,4F,47
790 DATA 20,3A,20,00,07,18,4C,4F,41,44,49,4E,47,20,45,52,52,4F,52,21,21,18
800 DATA 00,55,4E,4B,4E,4F,57,4E,42,4C,4F,43,4B,20,4E,55,4D,42,45,52,20,20
810 DATA 20,3A,20,00,4F,55,54,50,55,54,20,54,4F,20,50,52,49,4E,54,45,52,3F
820 DATA 20,20,59,2F,4E,29,0A,0D,07,00,00,21,65,A0,7E,B7,C8,CD,5A,BB,23,18
830 DATA F7
```



SUPER BASIC

THIS IS A 4K program written entirely in machine code. It is a utility to extend the resident Basic with 45 new commands.

The technique used is to copy the Basic Rom into the underlying Ram. Switch from Rom to Ram and alter it to jump to a new command list after all the existing commands have been checked. The program resides betwen $C000 and $D000.

If the program is called in direct mode there is a short delay before the title screen is displayed. If the call is from program mode there is a similar delay but no title screen will appear, and there will be no other effect on program running. All keys auto-repeat when Superbasic is in operation.

All the commands may be used in either direct or program modes, most will accept variables. The memory available to Basic is not affected unless the title command is used when the top of memory is lowered by 256 bytes to provide storage room. The existing Basic Rom can be reactivated by pressing Runstop Restore. The speed of the existing commands is not affected except where variables are assigned. If the program includes loops where variables are assigned and speed is important the command Let should be used.

The commands Windo, Fix and Title use interrupts and only one can be in operation at any one time. These commands should be turned off before attempting any input/output operations.

I have converted the machine code into Data statements and written a short Basic loader program to poke the data into memory. There are several data checks in the loader but is possible to fool them, so I recommend saving the loader and data before running, as even one wrong piece of data could cause a system crash.

Should a mistake be detected the loader will stop and a warning will appear on screen. If the mistake is a data error simply press Return and the faulty line will be listed, correct it and re-run.

To load in Superbasic enter

LOAD "SUPERBASIC",device,1

Where one is the device number for tape, eight for disc. Activate Superbasic by entering New followed by Return, and then

SYS50000.

Use the program line:

1 IF SU=0 then SU=1 : LOAD "SUPERBASIC",device,1

to load from within a Basic program.

The new commands

1. **VDU** syntax: VDU,B,S
   where B=0 to 15
   S=0 to 15
   Sets border and screen colours.
2. **INK** syntax: INK,C
   where C=0 to 15
   Sets current character colour.
3. **PLOT** syntax: PLOT,V,H
   where V=0 to 23
   H=0 to 39
   Positions cursor.

(continued on next page)

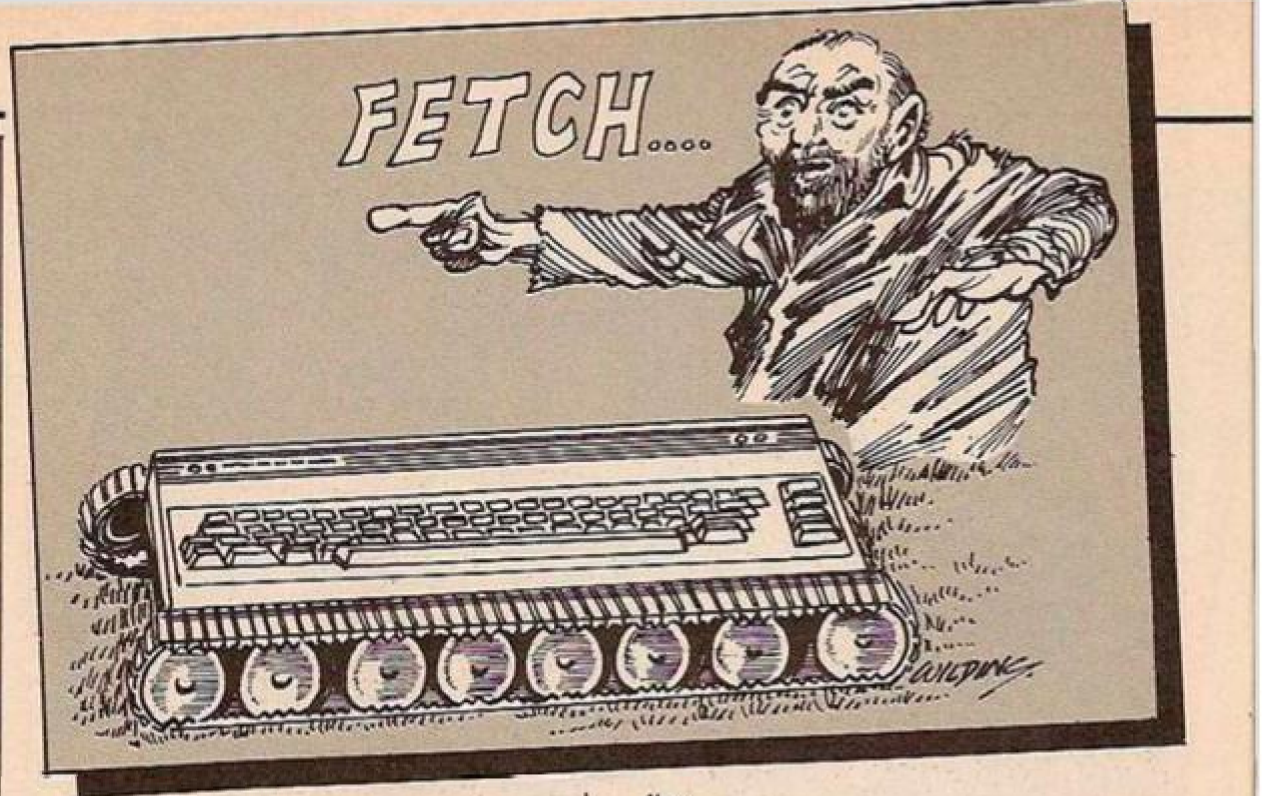
```
1 GOSUB10
2 GOSUB20
3 IFEN=1THEN30
4 IFER=1THEN60
5 GOTO2
10 POKE53280,0:POKE53281,0
11 PRINTCHR$(147);CHR$(30);"ASSEMBLING SUPERBASIC NOW"
12 PRINT:PRINT"PLEASE WAIT..."
13 RETURN
20 IFB=4096THENEN=1:GOTO28
21 FORA=0TO7
22 READD:POKE49152+B,D
23 B=B+1:C=C+D:T=T+D
24 NEXT
25 PRINTCHR$(19):PRINT:PRINTTAB(14);512-B/8;CHR$(157);CHR$(32)
26 READS:IFS<>CTHENER=1
27 C=0
28 RETURN
30 READS:IFS<>TTHENGOTO50
31 PRINTCHR$(147);"SUPERBASIC ASSEMBLY COMPLETE"
32 PRINT:PRINT"SAVE ROUTINE"
33 PRINT:PRINT"PRESS DEVICE NUMBER FOR SAVE"
34 PRINT"DATASETTE=1"
35 PRINTTAB(5);"DISK=8"
36 GETA$:IFA$=""THEN36
37 DE=VAL(A$)
38 IF(DE<>1ANDDE<>8)THENGOTO36
39 PRINT
40 IFDE=1THENPRINT"PLACE CASSETTE IN DATASETTE":GOTO42
41 PRINT"PLACE DISK IN DRIVE"
42 PRINT"THEN PRESS 'S' TO SAVE"
43 GETA$:IFA$=""THEN43
44 IFA$<>"S"THEN43
45 POKE2,DE:POKE43,0:POKE44,192:POKE45,0:POKE46,208
46 SAVE"SUPERBASIC",PEEK(2)
47 SYS50285
50 PRINTCHR$(147);"DATA ERROR...MISSING LINE"
51 PRINTTAB(13);"LINE ENTERED TWICE"
52 PRINTTAB(13);"OR CHECKSUM DATA ERROR"
53 PRINT:PRINT"PLEASE CHECK DATA LINES THEN RE-RUN"
54 END
60 PRINTCHR$(147);"DATA ERROR...PLEASE CHECK LINE";99+B/8
61 PRINT:PRINT:PRINT"LIST";99+B/8
62 FORI=0TO2:PRINTCHR$(145);:NEXT
63 END
100 DATA086,068,213,000,073,078,203,000,0721
101 DATA080,076,079,212,000,068,069,076,0660
102 DATA065,217,000,085,000,208,000,076,0731
103 DATA079,215,000,067,076,069,065,210,0781
104 DATA000,079,076,196,000,066,069,069,0555
105 DATA200,000,065,083,083,205,000,072,0716
106 DATA082,067,079,204,000,072,082,090,0676
107 DATA069,082,207,000,080,073,088,069,0668
108 DATA204,000,072,082,083,065,086,162,0754
109 DATA000,072,082,083,000,082,212,000,0611
110 DATA087,073,078,068,207,000,072,082,0667
111 DATA077,065,216,000,072,082,069,082,0663
112 DATA 210,000,074,085,077,208,000,076,0730
113 DATA 073,071,072,212,000,074,079,217,0798
114 DATA000,084,065,067,212,000,084,068,0580
115 DATA065,067,212,000,084,073,084,076,0661
116 DATA197,000,083,079,085,078,196,000,0718
117 DATA077,085,083,073,195,000,080,073,0666
118 DATA084,067,200,000,080,076,065,217,0789
119 DATA000,071,065,084,197,000,096,079,0582
120 DATA076,085,205,000,080,085,076,083,0690
121 DATA197,000,082,073,078,199,000,083,0712
122 DATA089,078,195,000,070,073,076,084,0665
123 DATA069,210,000,083,069,212,000,083,0726
124 DATA080,082,073,084,197,000,083,080,0679
125 DATA077,069,205,000,083,080,088,217,0819
126 DATA000,083,080,078,066,204,000,083,0594
127 DATA080,067,079,204,000,083,080,068,0661
128 DATA065,212,000,083,080,077,068,065,0650
129 DATA212,000,083,080,077,085,076,212,0825
130 DATA000,070,073,216,000,076,079,067,0581
131 DATA203,000,085,078,076,079,067,203,0791
132 DATA112,195,132,195,142,195,173,195,1339
133 DATA192,195,199,195,207,195,034,196,1413
134 DATA058,196,097,195,195,196,233,196,1366
135 DATA002,197,043,198,088,198,072,199,0997
136 DATA036,199,043,199,087,199,100,199,1062
137 DATA170,199,243,199,170,200,208,200,1589
138 DATA154,201,029,202,106,203,149,203,1247
139 DATA180,203,211,203,232,203,041,204,1477
140 DATA091,204,141,204,005,205,021,205,1076
141 DATA174,205,204,205,051,206,074,206,1325
142 DATA176,206,018,207,184,207,216,193,1407
143 DATA233,207,239,207,000,000,000,000,0886
144 DATA000,000,162,064,160,000,185,001,0572
145 DATA004,153,000,004,138,153,040,004,0496
146 DATA173,134,002,153,000,216,153,040,0871
147 DATA216,200,192,040,208,232,096,000,1184
148 DATA147,032,032,032,032,032,032,032,0371
149 DATA032,032,028,096,129,096,158,096,0667
150 DATA030,096,031,096,154,067,079,077,0630
151 DATA077,079,068,079,082,069,032,054,0540
152 DATA052,031,096,030,096,158,096,129,0688
153 DATA096,028,096,013,154,087,073,084,0631
154 DATA072,032,083,085,000,069,082,066,0569
155 DATA065,083,073,067,032,032,032,032,0416
156 DATA032,032,032,032,032,032,032,082,0306
157 DATA046,065,046,077,065,083,079,078,0539
158 DATA032,049,057,056,053,013,000,000,0260
159 DATA160,039,185,000,004,153,072,201,0814
160 DATA185,000,216,153,112,201,136,016,1019
161 DATA241,120,169,052,141,020,003,169,0915
162 DATA201,141,021,003,088,096,000,000,0550
163 DATA000,000,000,000,000,000,000,000,0000
164 DATA165,157,240,015,169,000,141,032,0919
165 DATA208,141,033,208,169,128,160,193,1240
166 DATA032,030,171,169,000,133,034,169,0738
167 DATA160,133,035,162,032,160,000,177,0859
168 DATA034,145,034,136,208,249,230,035,1071
169 DATA202,016,244,165,001,041,254,133,1056
170 DATA001,169,024,141,242,167,169,080,0993
171 DATA141,012,168,169,194,141,013,168,1006
172 DATA165,157,240,003,032,116,164,096,0973
173 DATA165,034,240,039,076,086,194,000,0834
174 DATA169,000,133,034,162,255,160,255,1168
175 DATA232,200,177,122,056,253,000,192,1232
176 DATA240,246,201,128,240,017,232,240,1544
177 DATA010,189,000,192,208,248,230,034,1111
178 DATA076,072,194,076,165,169,000,230,0982
179 DATA122,208,002,230,123,136,016,247,1084
180 DATA165,034,010,170,189,000,193,141,0902
181 DATA147,194,189,001,193,141,148,194,1207
182 DATA108,147,194,002,197,000,000,032,0680
183 DATA234,255,032,225,255,096,000,000,1097
184 DATA000,000,000,000,000,000,000,000,0000
185 DATA000,000,000,000,000,000,000,000,0000
186 DATA000,000,000,000,000,000,000,000,0000
187 DATA000,000,000,000,000,000,000,000,0000
188 DATA169,000,141,242,194,141,243,194,1324
189 DATA162,000,078,241,194,144,004,024,0855
190 DATA109,240,194,106,110,242,194,202,1397
191 DATA208,240,141,243,194,096,032,018,1172
192 DATA195,162,017,165,020,240,002,162,0963
193 DATA081,142,213,197,032,018,195,096,0974
```

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4. **DELAY** syntax: DELAY,S
   where S=0 to 65535
   Provides a delay in tenth seconds. The Stop key is inoperative during the delay.
5. **UPP** syntax: UPP
   Switches to upper case.
6. **LOW** syntax: LOW
   Switches to lower case.
7. **CLEAR** syntax: CLEAR,A,B
   where A=0 to 23
   B=0 to 24
   Clears screen from lines A to B.
8. **BEEP** syntax: BEEP,F
   where F=0 to 25
   Emits a beep at full volume and frequency F
9. **HRSPRT** syntax: HRSPRT
   When using the hi-resoloution Windo command the VIC-II chip 'sees' a different bank from usual (bank 1 instead of bank 2). This is to provide more space for Basic programs (2048 to 16384, 14336 bytes) than is usually possible with a hi-res screen.
   As a consequence the sprite pointers and data are expected from a different area of memory. The HRSPRT (hi-resolution sprite) command moves the existing sprite pointers and data to the correct bank.
   Sprite definitions using SPMEM and SPDAT commands should be completed before using HRSPRT.
   When using a hi-res screen the sprite pointers should not be above 111 as higher values may cause corruption of the bit-map.
10. **HRCOL** syntax: HRCOL
    Clears hi-resolution colour screen.
11. **HRZERO** syntax: HRZERO
    Zeroes the hi-resolution bit-map.
12. **WINDO** syntax: WINDO,L
    where L=0 to 24
    Uses interrupts to give a hi-resolution window from the top of the screen to line L. If L=0 the hi-res window is turned off but the bit-map is preserved.
    The bit-map screen is at $6000-$8000.
    The cursor is automatically moved to the text line below the window.
13. **HRSAV** syntax: HRSAV"name",D
    where D=1 or 8
    Saves bit-map to device D.
    Name should be 1-16 characters.

13b. The saved hi-resolution bit-map may be loaded by using the resident Load command.
    i.e. LOAD"name",device,1.
14. **HRMAX** syntax: HRMAX
    Prevents error messages from halting the program if illegal pixel commands are given. If negative pixel commands are given the error messages are not prevented.
15. **HRER** syntax: HRER
    Causes error messages to half the program if illegal pixel commands are given.
16. **PIXEL** syntax: PIXEL,P,V,H
    where P=0 or >0
    V=0 to 199
    H=0 to 319
    Sets or resets a pixel at vertical position V and horizontal position H. If P=0 then the pixel will always be lit. If P>0 then the pixel will be turned on if it is off, and off if it is already on.
    If an illegal position is used an error message will half the program.
17. **JUMP** syntax: JUMPA
    where A is any numeric variable corresponding to a legal line number.
    Provides a conditional jump to any Basic line.



18. **LIGHT** syntax: LIGHT
    Generates integer variables LX% and LY% which will contain the pixel positions for a light pen plugged into port 1.
19. **JOY** syntax: JOY
    Generates integer variables JY%, which will contain a anumeric indication of the position of a joystick in port two, and FR% for the fire button. JY%=0: centre
    1: up 5: up/left
    2: down 9: up/right
    4: left 6: down/left
    8: right 10: down/right
    FR%=0 fire button not pressed
    1: fire button pressed
20. **TITLE** syntax: TITLE(me$)
    where me$ is any string variable up to 256 characters.
    Uses interrupts to produce a sideways scrolling Title at the top of the screen.
    Lower case mode should be selected (using the Low command) before activating Title.
    To halt the scroll at any time press the Commodore key, if the CTRL and Commodore keys are pressed simultaneously the scroll rate is increased.
    If messages longer than a Basic line will allow are required concantation must be

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```
194 DATA000.000.000.000.000.000.000.000.0000
195 DATA000.000.000.000.000.000.000.000.0000
196 DATA032.121.000.201.044.208.001.096.0703
197 DATA076.000.175.032.138.173.076.247.0925
198 DATA183.096.032.000.195.032.115.000.0653
199 DATA032.011.195.096.000.000.000.000.0334
200 DATA141.071.195.142.072.195.169.000.0985
201 DATA141.073.195.141.074.195.141.074.1034
202 DATA195.162.000.078.072.195.144.004.0850
203 DATA024.109.071.195.106.110.073.195.0883
204 DATA202.208.240.141.074.195.096.013.1169
205 DATA000.064.003.000.000.000.000.000.0067
206 DATA169.094.141.000.003.169.195.141.0912
207 DATA001.003.076.100.195.128.076.139.0718
208 DATA227.076.000.128.169.255.141.138.1134
209 DATA002.076.000.194.000.000.000.000.0272
210 DATA032.018.195.165.020.072.032.018.0552
211 DATA195.165.020.141.032.208.104.141.1006
212 DATA033.200.096.000.032.018.195.165.0747
213 DATA020.141.134.002.096.000.032.018.0443
214 DATA195.165.020.072.032.018.195.165.0862
215 DATA020.201.040.176.012.169.104.201.0922
216 DATA025.176.006.170.024.032.240.255.0928
217 DATA096.076.072.170.000.032.018.195.0667
218 DATA162.072.160.254.136.208.253.202.1447
219 DATA200.240.190.020.200.242.096.000.1220
220 DATA169.142.032.210.255.096.000.169.1073
221 DATA014.032.210.255.096.000.000.032.0639
222 DATA018.195.165.020.201.025.176.070.0870
223 DATA072.032.018.195.165.020.201.026.0729
224 DATA176.060.104.197.020.176.055.133.0921
225 DATA021.169.000.133.034.169.004.133.0663
226 DATA035.164.021.136.048.006.032.018.0460
227 DATA196.076.243.195.169.032.160.039.1110
228 DATA145.034.136.016.251.230.021.165.0950
229 DATA021.197.020.240.016.160.001.076.0731
230 DATA243.195.162.040.230.034.208.002.1114
231 DATA230.035.202.208.247.096.076.072.1166
232 DATA170.000.169.255.160.001.145.043.0951
233 DATA032.051.165.165.034.024.216.105.0792
234 DATA002.133.045.165.035.133.046.076.0635
235 DATA094.166.032.219.207.169.015.141.1043
236 DATA024.212.169.000.141.005.212.169.0932
237 DATA255.141.006.212.169.033.141.004.0961
238 DATA212.162.096.032.179.238.202.208.1329
239 DATA250.169.000.141.024.212.096.000.0892
240 DATA173.017.208.041.223.141.017.208.1028
241 DATA173.002.221.009.003.141.002.221.0772
242 DATA173.000.221.041.252.009.003.141.0840
243 DATA000.221.169.021.141.024.208.096.0880
244 DATA237.169.237.141.129.196.173.017.1298
245 DATA208.009.050.141.017.208.234.234.1101
246 DATA169.000.141.229.197.141.230.197.1304
247 DATA141.231.197.173.002.221.009.003.0977
248 DATA141.002.221.173.000.221.041.252.1051
249 DATA009.002.141.000.221.173.024.208.0778
250 DATA041.240.009.008.141.024.208.173.0844
251 DATA024.208.041.015.009.112.141.024.0574
252 DATA208.096.000.173.033.208.041.015.0774
253 DATA133.034.173.134.002.041.015.010.0542
254 DATA010.010.010.024.101.034.162.000.0351
255 DATA157.000.092.157.000.093.157.000.0656
256 DATA094.157.000.095.202.208.241.096.1093
257 DATA000.169.096.133.252.169.000.133.0952
258 DATA251.160.000.145.251.136.208.251.1402
259 DATA230.252.166.252.224.128.208.243.1703
260 DATA096.000.032.222.194.165.021.208.0938
261 DATA041.165.020.201.200.176.035.141.0979
262 DATA220.197.032.018.195.165.021.240.1096
263 DATA018.201.001.208.024.165.020.201.0838
264 DATA064.176.010.165.020.141.226.197.1007
265 DATA165.021.141.227.197.032.151.194.1128
266 DATA208.007.076.058.199.076.243.207.1066
267 DATA000.173.228.197.141.232.197.141.1309
268 DATA229.197.173.226.197.141.233.197.1593
269 DATA141.230.197.173.227.197.141.231.1537
270 DATA197.141.234.197.234.234.234.173.1644
271 DATA232.197.074.074.074.141.235.197.1224
272 DATA173.233.197.141.236.197.173.234.1584
273 DATA197.074.110.236.197.074.110.236.1234
274 DATA197.074.110.236.197.141.237.197.1369
275 DATA173.232.197.041.007.141.238.197.1226
276 DATA173.233.197.041.007.141.239.197.1228
277 DATA169.007.056.237.239.197.141.239.1205
278 DATA197.169.000.133.251.169.096.133.1148
279 DATA252.174.235.197.240.016.230.252.1596
280 DATA165.251.024.105.064.133.251.144.1137
281 DATA002.230.252.202.208.240.173.236.1543
282 DATA197.010.010.010.144.003.230.252.0856
283 DATA024.101.251.133.251.144.002.230.1136
284 DATA252.165.251.024.109.230.197.133.1369
285 DATA251.144.002.230.252.174.239.197.1489
286 DATA160.000.189.210.197.017.251.145.1177
287 DATA251.096.001.002.004.008.016.032.0410
288 DATA064.128.200.000.050.000.000.000.0442
289 DATA050.200.000.006.025.000.002.007.0290
290 DATA000.160.015.169.032.153.255.000.0784
291 DATA136.208.250.032.121.000.201.034.0902
292 DATA240.019.153.000.001.200.032.115.0760
293 DATA000.201.034.240.000.153.000.001.0637
294 DATA200.192.016.208.241.132.253.032.1274
295 DATA115.000.032.018.195.165.020.201.0746
296 DATA001.240.007.201.000.240.003.076.0776
297 DATA000.175.096.032.241.197.169.001.0919
298 DATA166.020.160.255.032.186.255.165.1239
299 DATA253.162.000.160.001.032.189.255.1052
300 DATA169.000.133.251.169.096.133.252.1283
301 DATA165.251.162.000.160.128.032.216.1114
302 DATA255.169.001.032.195.255.096.000.1003
303 DATA162.008.189.247.007.208.004.202.1027
304 DATA208.240.096.157.247.095.134.002.1187
305 DATA162.064.032.032.195.133.053.024.0695
306 DATA105.064.133.055.173.073.195.133.0931
307 DATA054.133.052.160.000.177.052.145.0773
308 DATA054.200.192.064.208.247.166.002.1133
309 DATA076.095.190.032.018.195.165.021.0800
310 DATA200.031.165.020.208.003.076.000.0711
311 DATA199.201.024.176.020.141.255.207.1223
312 DATA032.062.199.165.020.010.010.010.0508
313 DATA024.105.049.141.255.207.076.188.1037
314 DATA190.076.096.196.169.027.141.017.0920
315 DATA208.169.127.141.013.220.169.207.1254
316 DATA141.020.003.169.190.141.021.003.0696
317 DATA169.129.141.026.208.000.096.169.1026
318 DATA001.141.025.208.173.018.208.201.0975
319 DATA001.176.012.032.129.196.173.255.0974
320 DATA207.141.018.208.076.239.190.032.1119
321 DATA096.196.169.000.141.018.208.173.1001
322 DATA013.220.041.001.240.003.076.049.0643
323 DATA234.076.188.254.234.076.188.254.1504
324 DATA169.001.141.025.208.169.049.141.0903
325 DATA020.003.169.234.141.021.003.032.0623
326 DATA096.196.076.023.199.234.234.169.1227
327 DATA129.141.013.220.169.000.141.026.0839
328 DATA208.000.096.000.169.001.141.035.0730
329 DATA199.096.000.169.000.141.035.199.0839
330 DATA096.000.173.035.199.208.005.162.0878
331 DATA014.188.000.003.096.000.166.020.0487
332 DATA160.000.024.032.240.255.096.000.0807
333 DATA169.127.141.013.220.169.001.141.0981
334 DATA025.208.032.139.190.096.000.076.0774
335 DATA090.199.032.150.173.032.247.183.1114
336 DATA076.163.160.000.173.020.208.056.0864
337 DATA233.051.072.173.019.208.056.233.1045
338 DATA029.162.002.032.032.195.169.204.0825
339 DATA133.069.169.217.133.070.173.073.1037
340 DATA195.133.101.173.074.195.133.100.1104
341 DATA032.231.176.133.073.132.074.032.0883
342 DATA202.169.234.169.216.133.070.104.1297
343 DATA133.101.169.000.133.100.032.231.0899
344 DATA176.133.073.132.074.032.202.169.0991
345 DATA096.000.169.000.133.100.173.000.0671
346 DATA220.041.016.240.006.169.000.133.0825
347 DATA101.240.004.169.001.133.101.169.0918
348 DATA190.133.069.169.210.133.070.032.1014
349 DATA231.176.133.073.132.074.032.202.1053
350 DATA169.173.000.220.041.015.133.002.0753
351 DATA169.015.056.229.002.133.101.169.0874
352 DATA202.133.069.169.217.133.070.032.1025
353 DATA231.176.133.073.132.074.032.202.1053
354 DATA169.096.000.169.027.141.017.208.0827
355 DATA169.127.141.013.220.169.096.141.1016
356 DATA020.003.169.200.141.021.003.169.0726
357 DATA001.141.018.208.169.000.133.189.0859
358 DATA169.159.133.190.169.006.141.160.1135
359 DATA200.169.000.141.169.208.169.129.1177
360 DATA141.026.208.096.169.001.141.025.0887
361 DATA208.173.018.208.201.001.240.076.1125
362 DATA169.001.141.018.208.173.022.208.0940
363 DATA009.008.141.022.208.173.022.208.0791
364 DATA041.240.141.022.208.173.141.002.0976
365 DATA201.002.208.003.076.150.208.201.1041
366 DATA006.208.005.169.254.141.160.208.1151
367 DATA173.160.208.201.254.208.060.169.1433
368 DATA006.141.160.208.032.090.193.172.1018
369 DATA169.208.177.189.208.005.169.255.1372
370 DATA141.169.208.238.169.208.141.039.1297
371 DATA004.076.155.208.173.022.208.041.0879
372 DATA247.141.022.208.173.022.208.041.1062
373 DATA248.024.189.168.208.141.022.208.1128
374 DATA206.160.208.206.160.208.169.058.1375
375 DATA141.018.208.173.013.220.041.001.0815
376 DATA240.003.076.049.234.076.188.254.1120
377 DATA006.031.120.169.049.141.020.003.0539
378 DATA169.234.141.021.003.169.129.141.1007
379 DATA013.220.169.200.141.022.208.169.1142
380 DATA027.141.017.208.169.000.141.026.0729
381 DATA208.169.254.141.025.208.096.000.1101
382 DATA169.159.133.052.133.056.032.121.0855
383 DATA000.201.040.240.005.162.011.108.0767
384 DATA000.003.032.115.000.133.069.032.0384
385 DATA115.000.201.036.240.006.009.120.0735
386 DATA133.070.208.243.032.115.000.201.1002
387 DATA041.208.226.169.255.133.013.032.1077
388 DATA231.176.133.251.132.252.160.000.1335
389 DATA177.251.170.200.177.251.133.253.1612
390 DATA200.177.251.133.254.160.000.177.1352
391 DATA253.153.000.159.200.202.224.000.1191
392 DATA208.245.169.000.153.000.159.032.0966
393 DATA115.000.096.000.000.000.000.000.0211
394 DATA000.000.000.000.160.039.185.072.0456
395 DATA201.153.000.004.185.112.201.153.1009
396 DATA000.216.136.016.241.076.049.234.0968
397 DATA032.032.032.032.032.032.032.032.0256
398 DATA032.064.064.064.064.064.003.015.0370
399 DATA013.013.015.004.015.018.005.032.0115
400 DATA054.052.064.064.064.064.064.032.0458
401 DATA032.032.032.032.032.032.032.032.0256
402 DATA062.062.062.062.062.062.062.062.0496
```

used.

i.e. D$=A$+B$+C$

When this command is used the top of Basic memory is lowered to provide storage space for the message, so this command is best used near the beginning of the program.

21. **TACT** syntax: TACT
    Activates the scrolling titles.
22. **TDACT** syntax: TDACT
    De-activates the titles.
    Also de-activates the Fix command.
23. **FIX** syntax: FIX
    Uses interrupts to fix the top screen line — even if a clear screen is used.
    Use Tdact to de-activate.
24. **SOUND** syntax: SOUND V, W, A, D, S, R

    where V=1 to 4
    W=1 to 4
    A=0 to 15
    D=0 to 15
    S=0 to 15
    R=0 to 15

    Sets waveform, attack, decay, sustain and release for voice V.
25. **MUSIC** syntax: MUSIC,V,N,O

    where V=1 to 4
    O=1 to 8

    Sets the frequency of voice V to the note indicated by N and octave O. N cannot be a string variable but must be one of the following: C,C#,D,D#,E,F,F#,G,G#, A,A#,B
26. **PITCH** syntax: PITCH,V,F

    where V=1 to 24
    F=0 to 255

    Sets the frequency of voice V to F.
27. **PLAY** syntax: PLAY,V

    where V=1 to 4

    Turns gate to voice V on.
28. **GATE** syntax: GATE,V

    where V=1 to 4

    Turns GATE to voice V off.
29. **VOLUM** syntax: VOLUM,V

    where V=0 to 15

    Sets SID volume to V.
30. **PULSE** syntax: PULSE,V,P1,P2

    where V=1 to 4
    P1=0 to 15
    P2=0 to 15

    Sets pulse bandwidth on voice V.
31. **RING** syntax: RING,V,S
    Sets output of voice V to ring modulation if S>0. If S=0 the ring modulation is turned off.
32. **SYNC** syntax: SYNC,V,S
    Sets output of voice to syncronisation if S>0. If S=0 the syncronisation is turned off.
33. **FILTER** syntax: FILTER,V,T,F

    where V=1 to 4
    T=L or H or B
    F=0 to 255

    Provides filtering of voice V.
    T cannot be a variable but must be either
    L for low-pass
    H for high-pass
    B for band-pass
    F gives the cut-off frequency of the filter, or the centre of the band-pass.
34. **SET** syntax: SET
    This command should be used once hear the start of any program using the sound commands.
    It zeroes all SID registers.
35. **SPRITE** syntax: SPRITE,S,M,P,V,H

    where S=1 to 8
    M=0 or 1
    P=0 or 1
    V=0 or 1
    H=0 or 1

    Sets multicolour mode, background priority, vertical and horizontal expansion on Sprite S.
36. **SPMEM** syntax: SPMEM,S,M

    where S=1 to 8
    M=0 to 255

    Sets 64 byte memory block for Sprite S. For safety M should be in the ranges 13 to 15 and Peek ((50*+1)/64 to 255.
37. **SPDAT** syntax:
    SPDAT,S,L,000000000000111111111111

    where S=1 to 8
    L=1 to 21

    This command must be preceded by the SPMEM command.
    Defines sprite data.
    S indicates the sprite to be defined.
    L indicates the line of the sprite to be defined.
    There must be 24 zeroes or ones.
    A zero makes that sprite pixel transparent.
    A one makes that sprite pixel solid.
38. **SPMDAT** syntax:
    SPMDAT,S,L,000111222333

    where S=1 to 8
    L=1 to 21

    S indicaates the sprite to be defined.
    L indicates the line of the sprite to be defined.
    There must be 12 zeroes, ones, twos or threes.
    This command is used in a similar way to the SPDAT command except that it defines multicolour sprite data.
    A zero produces a transparent pixel.
    A one produces a pixel in sprite S colour.
    A two produces a pixel in sprite multicolour one.
    A three produces a pixel in sprite multicolour two.
39. **SPMULT** syntax: SPMULT,C1,C2

    where C1=0 to 15
    C2=0 to 15

    Sets sprite multicolours.
40. **SPCOL** syntax: SPCOL,S,C

    where S=1 to 8
    C=8 to 15

    Sets Sprite S to colour C.
41. **SPXY** syntax: SPXY,S,V,H

    where S=1 to 8
    V=0 to 255
    H=0 to 350

    Sets the vertical and horizontal position of Sprite S.
    The MSB of the horizontal position is automatically set if above 255.
42. **SPNBL** syntax: SPNBL,S

    where S=0 to 255

    Enables Sprite S.
    sprite1=1 3=4 5=16 7=64
    sprite2=2 4=8 6=32 8=128
    add sprite codes together to form S.
43. **OLD** syntax: OLD
    Recovers a 'newed' program.
44. **LOCK** syntax: LOCK
    Prevents the use of Runstop/Restore to protect your program from prying eyes.
45. **UNLOCK** syntax: UNLOCK
    Re-enables the use of Runstop/Restore. ■

```
403 DATA062,002,024,135,181,006,062,254,0726
404 DATA062,062,030,062,062,254,062,014,0608
405 DATA062,062,006,005,007,024,002,000,0168
406 DATA000,000,240,000,000,200,000,000,0440
407 DATA000,000,032,018,195,032,231,202,0710
408 DATA144,005,162,014,100,000,003,032,0460
409 DATA230,202,032,018,195,032,108,203,1020
410 DATA176,240,234,234,172,153,201,200,1610
411 DATA200,200,200,166,020,189,198,202,1375
412 DATA153,160,194,032,018,195,032,013,0797
413 DATA203,176,215,165,020,106,106,106,1097
414 DATA106,106,133,002,032,018,195,032,0624
415 DATA013,203,176,198,172,153,201,200,1316
416 DATA200,200,200,200,165,020,024,101,1110
417 DATA002,153,160,194,153,000,212,032,0906
418 DATA018,195,032,013,203,176,171,165,0973
419 DATA020,106,106,106,106,106,133,002,0685
420 DATA032,018,195,032,013,203,176,154,0823
421 DATA172,153,201,200,200,200,200,200,1526
422 DATA200,165,020,101,002,153,160,194,0995
423 DATA153,000,212,096,000,032,018,195,0706
424 DATA032,231,202,144,005,162,014,100,0890
425 DATA000,003,032,250,202,032,115,000,0634
426 DATA056,233,065,168,192,001,200,003,0918
427 DATA168,012,076,120,202,192,004,200,0974
428 DATA005,160,005,076,120,202,192,000,0760
429 DATA200,005,160,018,076,120,202,192,0973
430 DATA002,200,005,160,009,076,120,202,0774
431 DATA192,003,200,005,160,011,076,120,0767
432 DATA202,192,005,200,005,160,014,076,0854
433 DATA120,202,192,014,200,005,160,008,0901
434 DATA076,120,202,162,014,100,000,003,0685
435 DATA032,115,000,201,035,208,009,200,0800
436 DATA032,115,000,076,136,202,234,234,1029
437 DATA185,202,202,133,032,185,215,202,1356
438 DATA133,033,032,018,195,165,021,200,0805
439 DATA210,165,020,240,214,201,009,176,1243
440 DATA210,169,128,198,020,240,004,106,1075
441 DATA076,163,202,133,036,032,026,203,0871
442 DATA165,039,172,153,201,153,160,194,1237
443 DATA153,000,212,200,165,038,153,160,1081
444 DATA194,153,000,212,096,000,016,032,0703
445 DATA064,120,000,134,142,150,159,160,0945
446 DATA179,189,200,212,112,119,126,000,1137
447 DATA030,024,131,126,250,006,172,243,0982
448 DATA230,199,124,151,000,000,000,165,0869
449 DATA021,208,012,165,020,240,008,201,0875
450 DATA004,176,005,198,020,096,234,056,0789
451 DATA096,000,164,020,162,006,230,020,0698
452 DATA202,208,251,136,208,246,165,020,1436
453 DATA141,153,201,096,000,165,021,208,0985
454 DATA230,165,020,201,016,176,225,096,1129
455 DATA000,000,166,032,134,034,032,049,0447
456 DATA203,166,035,134,038,166,033,134,0909
457 DATA034,032,051,203,166,035,134,039,0694
458 DATA096,169,000,162,000,134,035,160,0756
459 DATA000,056,229,036,000,038,035,006,0416
460 DATA034,042,040,144,005,229,036,076,0606
461 DATA076,203,101,036,136,208,237,176,1173
462 DATA003,101,036,024,038,035,096,000,0333
463 DATA165,021,200,011,165,020,240,007,0837
464 DATA201,005,176,004,198,020,096,056,0756
465 DATA096,000,032,018,195,032,231,202,0806
466 DATA032,250,202,032,018,195,165,021,0915
467 DATA144,013,162,014,100,000,003,169,0605
468 DATA000,172,153,201,153,160,194,153,1186
469 DATA000,212,165,020,200,153,160,194,1104
470 DATA153,000,212,096,000,032,018,195,0706
471 DATA032,231,202,176,221,032,250,202,1346
472 DATA172,153,201,200,200,200,200,185,1511
473 DATA160,194,009,001,153,160,194,153,1024
474 DATA000,212,096,000,032,018,195,032,0585
475 DATA231,202,176,190,032,250,202,172,1455
476 DATA153,201,200,200,200,200,185,160,1499
477 DATA194,041,254,153,160,194,153,000,1149
478 DATA212,096,000,032,018,195,032,013,0598
479 DATA203,176,159,173,184,194,005,020,1114
480 DATA141,184,194,141,024,212,096,000,0992
481 DATA032,018,195,032,231,202,176,138,1024
482 DATA032,250,202,032,018,195,032,013,0774
483 DATA203,176,127,165,020,010,010,010,0721
484 DATA010,172,153,201,200,200,153,160,1249
485 DATA194,153,000,212,032,018,195,032,0836
486 DATA013,203,144,013,162,014,100,000,0649
487 DATA003,165,020,172,153,201,200,200,1114
488 DATA200,153,160,194,153,000,212,096,1168
489 DATA000,032,018,195,032,231,202,176,0886
490 DATA227,032,250,202,032,018,195,172,1128
491 DATA153,201,200,200,200,200,165,020,1339
492 DATA240,012,185,160,194,009,004,153,0957
493 DATA160,194,153,000,212,096,185,160,1160
494 DATA194,041,251,153,160,194,153,000,1146
495 DATA212,096,000,032,018,195,032,231,0816
496 DATA202,176,177,032,250,202,032,018,1089
497 DATA195,172,153,201,200,200,200,200,1521
498 DATA165,020,240,012,185,160,194,009,0985
499 DATA002,153,160,194,153,000,212,096,0970
500 DATA185,160,194,041,253,153,160,194,1340
501 DATA153,000,212,096,000,032,018,195,0706
502 DATA165,021,200,120,165,020,240,005,1035
503 DATA201,008,144,013,162,014,100,000,0642
504 DATA003,141,023,212,032,115,000,201,0727
505 DATA072,208,029,173,184,194,041,015,0916
506 DATA009,064,141,184,194,141,024,212,0969
507 DATA032,115,000,032,018,195,165,021,0578
508 DATA208,218,165,020,141,022,212,096,1082
509 DATA201,066,208,016,173,184,194,041,1083
510 DATA015,009,032,141,184,194,141,024,0740
511 DATA212,076,184,204,201,076,208,188,1349
512 DATA173,184,194,041,015,009,016,141,0773
513 DATA184,194,141,024,212,076,184,204,1219
514 DATA173,184,194,041,015,141,184,194,1126
515 DATA141,024,212,169,000,141,022,212,0921
516 DATA141,023,212,096,000,169,000,160,0801
517 DATA025,153,160,194,153,000,212,136,1033
518 DATA016,247,096,000,253,032,099,206,0949
519 DATA144,013,162,014,100,000,003,168,0604
520 DATA185,223,205,141,019,205,185,231,1394
521 DATA205,141,020,205,032,018,195,165,0981
522 DATA021,208,223,165,020,240,012,173,1062
523 DATA019,205,013,027,208,141,027,208,0848
524 DATA076,076,205,173,020,205,045,027,0827
525 DATA208,141,027,208,032,018,195,165,0994
526 DATA021,208,191,165,020,240,012,173,1030
527 DATA019,205,013,028,208,141,028,208,0850
528 DATA076,108,205,173,020,205,045,028,0860
529 DATA208,141,028,208,032,018,195,165,0995
530 DATA021,208,159,165,020,240,012,173,0998
531 DATA019,205,013,023,208,141,023,208,0840
532 DATA076,140,205,173,020,205,045,023,0887
533 DATA208,141,023,208,032,018,195,165,0990
534 DATA021,208,127,165,020,240,012,173,0966
535 DATA019,205,013,029,208,141,029,208,0852
536 DATA076,172,205,173,020,205,045,029,0925
537 DATA208,141,029,208,096,000,032,099,0813
538 DATA206,144,013,162,014,100,000,003,0642
539 DATA141,019,205,032,018,195,165,021,0796
540 DATA208,231,165,020,172,019,205,153,1173
541 DATA247,007,096,000,032,099,206,176,0863
542 DATA226,056,233,001,010,141,019,205,0891
543 DATA032,018,195,076,240,205,234,234,1234
544 DATA001,002,004,008,016,032,064,128,0255
545 DATA254,253,251,247,239,223,191,127,1785
546 DATA165,021,208,191,165,020,172,019,0961
547 DATA205,200,153,000,208,032,018,195,1011
548 DATA165,021,240,023,173,019,205,106,0952
549 DATA168,185,224,205,013,016,208,141,1160
550 DATA016,208,165,020,172,019,205,153,0958
551 DATA000,208,096,173,019,205,106,168,0975
552 DATA185,232,205,045,016,208,141,016,1048
553 DATA208,165,020,172,019,205,153,000,0942
554 DATA208,096,000,032,018,195,165,021,0735
555 DATA240,013,162,014,100,000,003,165,0697
556 DATA020,234,234,234,234,141,021,208,1326
557 DATA096,000,032,099,206,176,235,072,0916
558 DATA032,018,195,165,021,208,227,104,0970
559 DATA168,136,165,020,153,039,208,096,0985
560 DATA000,000,000,032,018,195,165,021,0431
561 DATA208,009,165,020,240,005,201,009,0857
562 DATA176,002,096,056,096,000,032,099,0557
563 DATA206,176,191,168,185,247,007,141,1321
564 DATA240,194,162,064,142,241,194,234,1471
565 DATA234,234,032,192,194,032,018,195,1131
566 DATA165,021,208,231,165,020,240,227,1277
567 DATA201,022,176,223,170,202,240,015,1249
568 DATA160,003,238,242,194,208,002,238,1285
569 DATA243,194,136,208,245,240,238,096,1600
570 DATA032,110,206,168,000,162,000,032,0710
571 DATA115,000,201,048,240,018,201,049,0872
572 DATA240,002,208,187,109,000,207,013,1046
573 DATA241,194,141,241,194,076,217,206,1510
574 DATA189,000,207,045,241,194,141,241,1266
575 DATA194,232,224,000,208,217,173,242,1490
576 DATA194,133,251,173,243,194,133,252,1573
577 DATA173,241,194,145,251,169,000,141,1314
578 DATA241,194,200,192,003,208,190,169,1397
579 DATA000,234,234,032,115,000,096,000,0711
580 DATA128,064,032,016,008,004,002,001,0255
581 DATA127,191,223,239,247,251,253,254,1785
582 DATA000,000,032,110,206,160,000,162,0670
583 DATA000,032,115,000,201,048,240,017,0653
584 DATA201,049,240,061,201,050,240,070,1112
585 DATA201,051,240,079,162,014,100,000,0855
586 DATA003,189,000,207,232,056,125,008,0820
587 DATA207,045,241,194,141,241,194,232,1495
588 DATA224,000,208,213,173,242,194,133,1395
589 DATA251,173,243,194,133,252,173,241,1660
590 DATA194,145,251,200,169,000,141,241,1341
591 DATA194,192,003,208,186,032,115,000,0930
592 DATA096,189,000,207,232,013,241,194,1172
593 DATA141,241,194,076,063,207,232,189,1343
594 DATA000,207,013,241,194,141,241,194,1231
595 DATA076,063,207,189,000,207,232,024,0998
596 DATA125,000,207,013,241,194,141,241,1162
597 DATA194,076,063,207,000,032,099,206,0877
598 DATA144,013,162,014,100,000,003,168,0604
599 DATA185,247,007,141,032,194,162,064,1032
600 DATA142,241,194,032,192,194,173,242,1410
601 DATA194,133,251,173,243,194,133,252,1573
602 DATA169,000,160,064,145,251,096,000,0885
603 DATA032,018,195,165,021,208,211,165,1015
604 DATA020,201,016,176,205,141,037,208,1004
605 DATA032,018,195,165,021,208,195,165,0999
606 DATA020,201,016,176,189,141,038,208,0989
607 DATA096,000,000,032,018,195,165,020,0526
608 DATA141,001,212,169,000,141,000,212,0876
609 DATA096,169,225,141,040,003,096,169,0939
610 DATA237,208,240,173,035,199,208,003,1311
611 DATA076,050,199,076,029,197,000,209,0836
612 DATA477077
```

Listing 1.

```
10 REM*****************************
15 REM***    SMOOTH SCROLLING    ***
20 REM***                        ***
30 REM*** (C) 1985 NALIN SHARMA  ***
40 REM***                        ***
50 REM*****************************
100 S=49152:F=49426:T=0:CHK=31144:
    BASE=51200
110 FORX=STOF:READA:T=T+A:POKEX,A:NEXT
130 IF T <> CHK THEN PRINT"DATA
    ERROR":END
200 FORX=0TO255:POKEBASE+X,X:NEXT
210 SYS49152
220 PRINT"[control characters]
    SMOOTH SCROLLING BY NALIN SHARMA "
230 GOTO 230
1000 DATA 169, 147, 32, 210, 255, 32
1010 DATA 164, 192, 32, 12, 192, 96
1020 DATA 120, 169, 58, 141, 20, 3
1030 DATA 169, 192, 141, 21, 3, 169
1040 DATA 0, 141, 62, 3, 169, 1
1050 DATA 141, 26, 208, 173, 17, 208
1060 DATA 41, 127, 141, 17, 208, 169
1070 DATA 36, 141, 18, 208, 169, 255
1080 DATA 141, 25, 208, 169, 0, 141
1090 DATA 14, 220, 88, 96, 174, 62
1100 DATA 3, 142, 63, 3, 142, 32
1110 DATA 208, 138, 73, 15, 141, 33
1120 DATA 208, 238, 63, 3, 189, 70
1130 DATA 3, 56, 237, 63, 3, 157
```

SMOOTH SCROLL

SMOOTH SCROLLING is probably the most widely used technique in commercially available software — mainly because it is very simple (once you know how) and the results are instantly impressive.

To do smooth scrolling on the CBM-64 you have to resort to machine code, and in particular raster interrupts, a subject whose importance I have tried very hard to stress when writing games of the CBM-64.

The program in this article will take a string of characters and smooth scroll them horizontally to the left. However, the string will appear on eight different lines from top to bottom of the screen, each string scrolling at a greater speed than the previous one. So the top line will scroll at one pixel per cycle, the next at two pixels per cycle and so on. This demolishes the myth that for smooth graphics you must move them one pixel at a time.

To help you understand the program, see figure 1 which shows what happens to characters at either end of a line when it is scrolled one pixel at a time from right to left. You can see that columns 0 and 39 are blanked out as the CBM-64 is in 38 column mode. This is so that when the characters move in and out of the screen, they do so smoothly and naturally.

If there was no 38 column mode the characters would just appear and disappear at either side of the screen, giving a very jerky appearance. Returning to the diagram, XFine is the name I have given to the lowest three bits of the scrolling register in the Vic chip — XSCL = Vic + 22.

The process for scrolling to the left is to gradually decrease XFine from 7 to 0, then you must reset XFine to 7 and the line must be scrolled one whole character to the left. This last process must be done when the raster is not "falling in between" the line to be scrolled. Hence you must use raster interrupts — otherwise the scrolling will probably be smooth, but extremely jerky.

Listing 1 is the Basic loader for the smooth scrolling program which is actually quite short — 274 bytes — and should be relatively painless to key in. Line 200 pokes in the characters to be scrolled, therefore you can make the necessary alterations to scroll a sentence of your own choice. Also, remember to save the program before running it.

Listing 2 is the assembler listing for the program. It is similar in structure to the 64 sprites article a couple of months ago because of the use of raster interrupts, and so should be fairly easy to comprehend.

One final point is that because scrolling takes up a lot of time, it makes sense to use multi colour mode — 14 colours — in commercial programs. The reason for this is that there is only so much you can do during the interrupt schedule, before the raster reaches the top of the screen, and by using multi-colour mode you don't have to bother scrolling the colour memory.

Listing 2.

```
  10 C000          *=$C000 !SMOOTH SCROLLING COPYRIGHT 1985 NALIN SHARMA
  40 C000          STRINGBEG  = $C000        !START OF STRING OK
  50 C000          VIC        = 53248
  51 C000          HRAST      = VIC+17       !RASTER REGISTER
  52 C000          RAST       = VIC+18
  53 C000          IRST       = VIC+25
  54 C000          ERST       = VIC+26
  55 C000          XSCL       = VIC+22       !REGISTER WHICH CONTROL
S HORIZONTAL SCROLLING
  60 C000          SCREEN     =. 1024
  70 C000          S1         = 251
  80 C000          S2         = 252
 860 C000          VB         = 830
 890 C000          XFINE      = VB+2         !MY 3 SCROLLING REGISTE
RS
 900 C000          RASNUM     = VB           !INTERRUPT NUMBER
 910 C000          XDISP      = VB+1         ! HOLDS AMOUNT OF HORIZ
ONTAL SCROLLING (1-8 PIXELS)
 920 C000          COLUMN     = VB+16        ! START OF SENTENCE ON
SCREEN FROM 256 CHAR. STRING
 940 C000          BORDER     = 53280
 945 C000          BACKGR     = 53281
1000 C000          !
1010 C000          !
1020 C000          !
1070 C000 A993     START      LDA #147
1080 C002 20D2FF              JSR $FFD2      !CLEAR SCREEN
1085 C005 20A4C0              JSR SETVARBS   !SET UP VARIABLES
1090 C008 200CC0              JSR NEWINT     ! SET NEW INTERRUPTS
1190 C00B 60                  RTS            !RETURN TO BASIC
1210 C00C 78       NEWINT     SEI
1220 C00D A93A                LDA #<STINT    !LOW BYTE INTERRUPT POI
NTER
1230 C00F 8D1403              STA $0314
1232 C012 A9C0                LDA #>STINT    !HIGH BYTE
1234 C014 8D1503              STA $0315
1250 C017 A900                LDA #0         !NUMBER OF INTERRUPT
1260 C019 8D3E03              STA RASNUM
1262 C01C A901                LDA #1         !ALLOW INTERRUPTS TO BE
 CAUSED BY RASTER
1263 C01E 8D1AD0              STA ERST
1264 C021 AD11D0              LDA HRAST      !HIGH BIT RASTER LINE
1265 C024 297F                AND #127
1266 C026 8D11D0              STA HRAST
1267 C029 A924                LDA #36        !LOW BYTE RASTER LINE
1268 C02B 8D12D0              STA RAST
1269 C02E A9FF                LDA #255
1270 C030 8D19D0              STA IRST       !CLEAR RASTER LATCH
1272 C033 A900                LDA #0
1274 C035 8D0EDC              STA 56334      !CBM INTERRUPTS OFF
1277 C038 58                  CLI            !READY TO BEGIN
1290 C039 60                  RTS            !RETURN
1300 C03A          !
1310 C03A          !
1320 C03A          !
1500 C03A AE3E03 STINT        LDX RASNUM     !START INTERRUPTS
1505 C03D 8E3F03              STX XDISP
1507 C040 8E20D0              STX BORDER
1509 C043 8A                  TXA
1510 C044 490F                EOR #15
1512 C046 8D21D0              STA BACKGR
1515 C049 EE3F03              INC XDISP      !AMOUNT TO SCROLL BY
1520 C04C BD4003              LDA XFINE,X
1530 C04F 38                  SEC
1532 C050 ED3F03              SBC XDISP      !DO LEFT MOVEMENT
1534 C053 9D4003              STA XFINE,X
1540 C056 2980                AND #128
1550 C058 C980                CMP #128       !GONE OVER LIMIT ?
1600 C05A D00E                BNE NOSCROLL   !NO--------------
1610 C05C FE4E03              INC COLUMN,X   !YES - MOVE SENTENCE BY
 ONE WHOLE CHAR. TO THE LEFT
1620 C05F 2080C0              JSR PLOTLINE   !PRINT THE SENTENCE
1630 C062 BD4003              LDA XFINE,X    !RESET FINE SCROLL REGI
STER SIMPLY BY MASKING
1640 C065 2907                AND #7
1641 C067 9D4003              STA XFINE,X
1642 C06A AD16D0 NOSCROLL     LDA XSCL
1644 C06D 29F8                AND #%11111000
1646 C06F 1D4003              ORA XFINE,X    ! PUT IN PRESENT FINE S
CROLL REG. FOR THE VIC CHIP
1647 C072 8D16D0              STA XSCL
1648 C075 8E3E03              STX RASNUM
1650 C078 A981   NEXTLN       LDA #129
1660 C07A 8D19D0              STA IRST       !CLEAR INTERRUPT LATCH
1670 C07D AD11D0              LDA HRAST
1680 C080 297F                AND #127
```

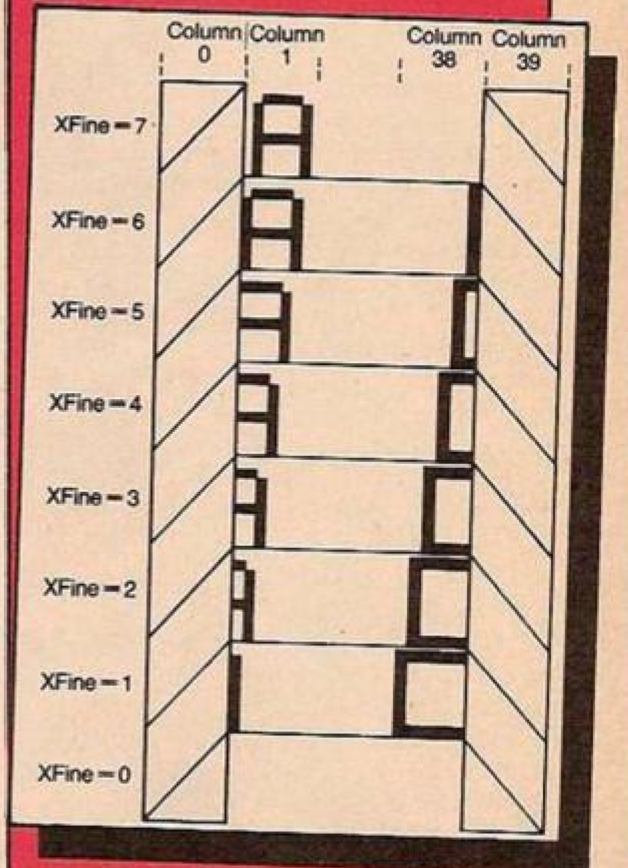
```
1140 DATA 70, 3, 41, 128, 201, 128
1150 DATA 208, 14, 254, 78, 3, 32
1160 DATA 216, 192, 189, 70, 3, 41
1170 DATA 7, 157, 70, 3, 173, 22
1180 DATA 208, 41, 248, 29, 70, 3
1190 DATA 141, 22, 208, 142, 62, 3
1200 DATA 169, 129, 141, 25, 208, 173
1210 DATA 17, 208, 41, 127, 141, 17
1220 DATA 208, 238, 62, 3, 173, 62
1230 DATA 3, 41, 7, 141, 62, 3
1240 DATA 170, 189, 250, 192, 141, 18
1250 DATA 208, 224, 0, 208, 3, 76
1260 DATA 49, 234, 104, 168, 104, 170
1270 DATA 104, 64, 162, 0, 169, 0
1280 DATA 157, 62, 3, 232, 224, 32
1290 DATA 208, 248, 169, 1, 141, 33
1300 DATA 208, 169, 3, 141, 32, 208
1310 DATA 162, 0, 169, 1, 157, 0
1320 DATA 216, 157, 0, 217, 157, 0
1330 DATA 218, 157, 0, 219, 232, 224
1340 DATA 0, 208, 239, 173, 22, 208
1350 DATA 41, 247, 141, 22, 208, 96
1360 DATA 138, 72, 10, 168, 185, 2
1370 DATA 193, 133, 251, 185, 3, 193
1380 DATA 133, 252, 160, 0, 189, 78
1390 DATA 3, 170, 189, 0, 200, 145
1400 DATA 251, 232, 200, 192, 40, 208
1410 DATA 245, 104, 170, 96, 5, 58
1420 DATA 82, 106, 130, 154, 178, 202
1430 DATA 0, 4, 120, 4, 240, 4
1440 DATA 104, 5, 224, 5, 88, 6
1450 DATA 208, 6, 72, 7, 255, 0
```

Nalin Sharma with a simple technique for impressive scrolling.



Top line scrolls at 1 pixel per cycle, the next at 2 pixels per cycle and so on.

Figure 1.




```
 1690 C082 8D1100           STA HRAST
 1720 C085 EE3E03           INC RASNUM              !NEXT RASTER NUMBER
 1730 C088 AD3E03           LDA RASNUM
 1740 C08B 2907             AND #7
 1750 C08D 8D3E03           STA RASNUM
 1751 C090 AA               TAX
 1752 C091 BDFAC0           LDA RASLINE,X           !GET NEXT LINE TO INTER
RUPT
 1754 C094 8D1200           STA RAST
 1760 C097 E000             CPX #0
 1770 C099 D003             BNE RETFROMINT
 1810 C09B 4C31EA GOBACK    JMP $EA31               !SERVICE CBM INTERRUPTS
 EVERY EIGTH INTERRUPT
 2070 C09E 68    RETFROMINT  PLA                    !PROCEDURE FOR RETURNIN
G FROM THE OTHER 7 INTERRUPTS
 2080 C09F A8               TAY
 2090 C0A0 68               PLA
 2100 C0A1 AA               TAX
 2110 C0A2 68               PLA
 2120 C0A3 40               RTI
 3000 C0A4          !
 3010 C0A4          !
 3020 C0A4          !
 4000 C0A4          ! INITIALISE PROGRAM
 4010 C0A4          !
 4020 C0A4          !
 5000 C0A4 A200   SETVARBS  LDX #0
 5010 C0A6 A900             LDA #0
 5020 C0A8 9D3E03 SETLOOP    STA V8,X
 5030 C0AB E8               INX
 5040 C0AC E020             CPX #32
 5050 C0AE D0F8             BNE SETLOOP
 5060 C0B0 A901             LDA #1
 5070 C0B2 8D2100           STA BACKGR
 5080 C0B5 A903             LDA #3
 5090 C0B7 8D2000           STA BORDER
 5100 C0BA A200             LDX #0
 5110 C0BC A901             LDA #1                  !CHAR COLOUR
 5120 C0BE 9D00D8 COLLOOP    STA $D800,X
 5130 C0C1 9D00D9           STA $D900,X
 5140 C0C4 9D00DA           STA $DA00,X
 5150 C0C7 9D00DB           STA $DB00,X
 5160 C0CA E8               INX
 5170 C0CB E000             CPX #0
 5180 C0CD D0EF             BNE COLLOOP
 5190 C0CF AD16D0           LDA XSCL
 5200 C0D2 29F7             AND #%11110111          !38 COLUMNS
 5210 C0D4 8D16D0           STA XSCL
 5600 C0D7 60               RTS
 5000 C0D8          !
 5010 C0D8          !
 5020 C0D8          !
 5030 C0D8          ! SUB. TO PRINT A LINE ON THE SCREEN,DEPENDING ON THE RASTER N
UMBER,
 5040 C0D8          ! FROM THE 256 CHAR. STRING YOU HAVE ENTERED
 5050 C0D8          !
 5060 C0D8          !
 5070 C0D8          !
 6000 C0D8 8A     PLOTLINE  TXA
 6005 C0D9 48               PHA
 6010 C0DA 0A               ASL A
 6020 C0DB A8               TAY
 6030 C0DC B902C1           LDA SCDAT,Y
 6040 C0DF 85FB             STA S1                  !LO BYTE SCREEN LINE
 6050 C0E1 B903C1           LDA SCDAT+1,Y
 6060 C0E4 85FC             STA S2                  !HI BYTE SCREEN LINE
 6070 C0E6 A000             LDY #0
 6080 C0E8 BD4E03           LDA COLUMN,X
 6085 C0EB AA               TAX
 6090 C0EC BD00C8 SCRLOOP    LDA STRINGBEG,X
 6100 C0EF 91FB             STA (S1),Y
 6110 C0F1 E8               INX
 6120 C0F2 C8               INY
 6130 C0F3 C028             CPY #40
 6140 C0F5 D0F5             BNE SCRLOOP
 6300 C0F7 68               PLA
 6310 C0F8 AA               TAX
 6320 C0F9 60               RTS
 9010 C0FA 053A52 RASLINE    BYT 5,58,82,106,130,154,178,202
 9020 C102 000478 SCDAT      WOR SCREEN,SCREEN+120,SCREEN+240,SCREEN+360,SCREEN
+480
 9030 C10C 5806D0            WOR SCREEN+600,SCREEN+720,SCREEN+840
 D021 BACKGR        D020 BORDER        C0BE COLLOOP       034E COLUMN
 D01A ERST          C09B GOBACK        C070 NEXTLN        D019 IRST
 C00C NEWINT        C070 NEXTLN        C06A HOSCROLL      C0D8 PLOTLINE
 C0FA RASLINE       033E RASNUM        D012 RAST          C09E RETFROMINT
 00FB S1            00FC S2            C102 SCDAT         0400 SCREEN
 C0EC SCRLOOP       C0A8 SETLOOP       C0A4 SETVARBS      C000 START
 C03A STINT         C800 STRINGBEG     033E V8            D000 VIC
 033F XDISP         0346 XFINE         D016 XSCL
```

Listing 1.

```
 1 CLEAR 29999
 2 LOAD "IMP1ide2"CODE
 3 LOAD "IMP1ide3"CODE
 9 LET n=0: BORDER 0: PAPER 0:
INK 3: CLS : BRIGHT 1: PRINT #1
;AT 1,0;"POWER=0000     LEVEL=1
  LIVES=5"
 11 PLOT 91,75: DRAW 73,0: DRAW
0,25: DRAW -73,0: DRAW 0,-25
 12 PLOT 89,72: DRAW 78,0: DRAW
0,31: DRAW -78,0: DRAW 0,-31
 20 FOR x=0 TO 1: FOR f=83 TO 1
10 STEP 8: PLOT f+x,0: DRAW 0,20
: DRAW 16,16: DRAW 0,36: PLOT f+
x+16,105: DRAW 0,34: DRAW -16,16
: DRAW 0,20
 30 NEXT f: NEXT x
 40 FOR x=0 TO 1: FOR f=147 TO
175 STEP 8: PLOT f+x,0: DRAW 0,2
0: DRAW -16,16: DRAW 0,36: PLOT
f+x-16,105: DRAW 0,34: DRAW 16,1
6: DRAW 0,20
 50 NEXT f: NEXT x
 51 FOR f=75 TO 90 STEP 8: PLOT
20,f: DRAW 24,0: DRAW 8,-8: DRA
W 24,0: DRAW 8,8: DRAW 4,0: NEXT
 f
 52 FOR f=75 TO 90 STEP 8: PLOT
20,f: DRAW 24,0: DRAW 8,-8: DRA
W 24,0: DRAW 8,8: DRAW 4,0: NEXT
 f
 53 FOR f=92 TO 106 STEP 8: PLO
T 20,f: DRAW 24,0: DRAW 8,8: DRA
W 24,0: DRAW 8,-8: DRAW 4,0: NEX
T f
 54 FOR f=91 TO 106 STEP 8: PLO
T 20,f: DRAW 24,0: DRAW 8,8: DRA
W 24,0: DRAW 8,-8: DRAW 4,0: NEX
T f
 55 FOR f=83 TO 94 STEP 8: PLOT
 168,f+8: DRAW 4,0: DRAW 8,8: DR
AW 24,0: DRAW 8,-8: DRAW 24,0: N
EXT f
 56 FOR f=84 TO 94 STEP 8: PLOT
 168,f+8: DRAW 4,0: DRAW 8,8: DR
AW 24,0: DRAW 8,-8: DRAW 24,0: N
EXT f
 57 FOR f=76 TO 85 STEP 8: PLOT
 168,f: DRAW 4,0: DRAW 8,-8: DRA
W 24,0: DRAW 8,8: DRAW 24,0: NEX
T f
 58 FOR f=75 TO 85 STEP 8: PLOT
 168,f: DRAW 4,0: DRAW 8,-8: DRA
W 24,0: DRAW 8,8: DRAW 24,0: NEX
T f
 110 REM enter capital letters
        between quotation
        marks in Graphics Mode
 111 PRINT AT 8,12;"CCCCCCCC"
 112 PRINT AT 13,12;"DDDDDDDD"
 113 FOR f=9 TO 12: PRINT AT f,2
0;"B": NEXT f
 115 FOR f=9 TO 12: PRINT AT f,2
;"A": NEXT f
 116 FOR f=0 TO 21: PRINT AT f,7
; PAPER 1; INK 7; BRIGHT 0;" ":
 NEXT f
 117 FOR f=0 TO 21: PRINT AT f,2
3; PAPER 1; INK 7; BRIGHT 0;" "
: NEXT f
```

IMPULSE

YOU PLAY the part of Max Headrom whose mission is to keep control of the internal workings of the computer.

To do this you must collect power from the electronic impulses travelling through the circuit. They must pass through the top of Max's head to gain power. Having obtained 1000 points computers will start to flash — indicating that the computer needs attention and you must go to it.

As you do this you will lose power. You must reach all the computers needing attention before power loss is stopped. If you lose all your power you lose a life. If, however, you complete your task you go on to the next level.

Just to make life difficult there are "bugs" which are fatal. You only start with two but they increase in number with each new level.

Each time you lose a life the "bugs" are reduced to only two but don't be fooled they will soon reactivate themselves. The best way to learn the game is to play it!! So get typing.

Keyboard controls are:

Up	=	any key on the top row
Down	=	any key on the bottom row
Right	=	any key on the right
Left	=	any key on the left

Listing 4.

```
 10 DEF FN h(h$)=16*(CODE h$(1)
-48-(7 AND h$(1)>"9"))+CODE h$(2
)-48-(7 AND h$(2)>"9")
 19 REM h/dhd
 20 INPUT "Start ";s
 30 INPUT "Finish ";f
 39 REM fd
 40 FOR n=s TO f STEP 8
 50 LET tot=0: PRINT n;": ";
 60 INPUT h$: PRINT h$;
 70 LET x=0
 80 FOR b=1 TO LEN h$ STEP 2
 90 LET z=FN h(h$): LET tot=tot
+z
 100 POKE n+x,z
 110 LET h$=h$(3 TO ): LET x=x+1
 120 NEXT b
 130 PRINT " = ";: INPUT t: PRIN
T t
 140 IF tot<>t THEN PRINT "input
 error - try again": GO TO 50
 150 NEXT n
 160 REM enter STOP to stop
```

Listing 2.

[illegible]

Listing 3.

```
64000  0000000019980E70 = 303
64008  05101A5B2A5A5B1A = 379
64016  87E6499212481428 = 702
64024  2814442270E00000 = 345
64032  0000000000000F00 = 15
64040  10802EC0783FBA2  = 1026
64048  FBB67BBE3BBE177C = 1134
64056  7FF0FFF800000000 = 881
64064  0000000000000070 = 112
64072  01E8037113EE50DF = 1012
64080  60DF70DE30DC3EE8 = 1254
64088  1FFE0FFF00000000 = 585
64096  0000030003002400 = 156
64104  018003C007E00D80 = 744
64112  0FF007E003D01998 = 662
64120  300120047 00E0000 = 222
64128  0000400260065000A = 255
64136  2814142812480990 = 363
64144  07E000E000FF00560 = 
64152  0A50100231C10000 = 196
64160  000038107 42E0240 = 312
64168  018003C007E01D88 = 768
64176  3FF07C3E77EE83C6 = 1155
64184  700E381C00000000 = 210
64192  0000181824244242 = 252
64200  6186630C07E01D88 = 972
64208  3FFC7FFE0FF01BD8 = 1194
64216  3240300018100000 = 270
64224  000031C00FF005A0 = 675
64232  0FF01E7837FF17BDE = 1065
64240  7C3E6FF66FF647E2 = 1197
64248  07E00E7010380000 = 441
64256  7FFC5554555547FFC = 1096
64264  7FFC729C6C6C6C6C = 1081
64272  729C7FFC7556AAC  = 1136
64280  7556AAC7FFC7FFC  = 1245
64288  7FFC5554555547FFC = 1096
64296  7FFC6842CE7C7CEC = 1153
64304  6420C7FFC7556AAC = 1010
64312  7556AAC7FFC7FFC  = 1245
64320  7FFC5554555547FFC = 1096
64328  7FFC642C7CE6E7C  = 1117
64336  6840C7FFC7556AAC = 1046
64344  7556AAC7FFC7FFC  = 1245
64352  7FFC5554555547FFC = 1096
64360  7FFC729C6C6C6C6C = 1081
64368  729C7FFC7556AAC  = 1136
64376  7556AAC7FFC7FFC  = 1245
64384  7FFC5554555547FFC = 1096
64392  7FFC6842CE7C7CEC = 1153
64400  6420C7FFC7556AAC = 1010
64408  7556AAC7FFC7FFC  = 1245
64416  7FFC5554555547FFC = 1096
64424  7FFC642C7CE6E7C  = 1117
64432  6840C7FFC7556AAC = 1046
64440  7556AAC7FFC7FFC  = 1245
64448  7FFC5554555547FFC = 1096
64456  7FFC729C6C6C6C6C = 1081
64464  729C7FFC7556AAC  = 1136
64472  7556AAC7FFC7FFC  = 1245
64480  7FFC5554555547FF3 = 1087
64488  00CE0BE450CE0BE5 = 984
64496  5010170C0ACE0BE8 = 813
64504  [illegible]
64512  33F05C0500DB02DB = 828
64520  024000C352380007 = 616
64528  520C025C0EC05771 = 594
64536  0EF3002117C81EFE = 805
64544  EF7618011300 3E2A = 366
64552  34FE22A0FE3A6BFE = 1301
64560  329DFED14B0EC83A = 1021
64568  3DFEFEFFF0040D3B = 1231
64576  13AF3A6BFE3202FE = 1104
64584  2AA0FE5A23EE2322 = 740
64592  A0FEED4B9FCEDAA  = 1511
64600  [illegible] = 1000
64608  E6073C32BFE329F  = 965
64616  FED086123 29FEDD = 1308
64624  3E1000CFE0CE04B  = 1021
64632  [illegible] = 1248
64640  [illegible] = 963
64648  [illegible] = 1407
64656  [illegible] = 1190
64664  CDAA223FEFE3298 = 1064
64672  FE3A9FFE32A9FEDF = 1404
64680  3E0F004E3C03FCDD = 1020
64688  [illegible] = 747
64696  3EFEFE003505CB01 = 910
64704  3E20FE33[illegible] = 1065
64712  [illegible] = 751
64720  C318462004EFA118 = 565
64728  0EA10400FD7AB14F = 1007
64736  5371C9C82A3CB1838 = 912
64744  04C501130FC0CB16 = 695
64752  4828071E11DC0DFD = 823
64760  1802D621ID20E43A = 541
```

```
116 INK 7: PRINT AT 5,0; PAPER
1; BRIGHT 0;"

119 INK 7: PRINT AT 15,0; PAPER
1; BRIGHT 0;"

120 INK 3: PLOT 0,62: DRAW 16,0
: DRAW 0,61-10: DRAW -16,0
121 PLOT 255,62: DRAW -16,0: DR
AW 0,61-10: DRAW 16,0
130 FOR f=8 TO 13: PRINT INK 4;
PAPER 0;AT f,0;"SS": NEXT f
140 FOR f=8 TO 13: PRINT INK 4;
PAPER 0;AT f,30;"SS": NEXT f
300 INK 3: PLOT 0,39: DRAW 15,0
: DRAW 0,-24: DRAW 25,0: DRAW 0,
24: DRAW 15,0: DRAW 0,-39
304 PLOT 72,0: DRAW 0,39: DRAW
111,0: DRAW 0,-39
305 PLOT 200,0: DRAW 0,39: DRAW
15,0: DRAW 0,-24: DRAW 26,0: DR
AW 0,24: DRAW 14,0
309 PLOT 0,135: DRAW 15,0: DRAW
0,25: DRAW 26,0: DRAW 0,-25: DR
AW 14,0: DRAW 0,39
311 PLOT 72,175: DRAW 0,-39: DR
AW 111,0: DRAW 0,39
312 PLOT 200,175: DRAW 0,-39: D
RAW 14,0: DRAW 0,24: DRAW 26,0:
DRAW 0,-24: DRAW 14,0
315 PLOT 72,56: DRAW 111,0: DRA
W 0,63: DRAW -111,0: DRAW 0,-63
316 PLOT 0,56: DRAW 55,0: DRAW
0,63: DRAW -55,0
318 PLOT 255,56: DRAW -55,0: DR
AW 0,63: DRAW 55,0
400 PRINT AT 17,2; INK 3; PAPER
1;"   "; INK 0; PAPER 7;AT 18,2
;"EFG";AT 19,2;"HIJ"
401 PRINT AT 17,27; INK 3; PAPE
R 1;"   "; INK 0; PAPER 7;AT 18,
27;"EFG";AT 19,27;"HIJ"
402 PRINT OVER 1;AT 2,27; INK 0
; PAPER 7;"EFG";AT 3,27;"HIJ"; I
NK 3; PAPER 1;AT 4,27;"   "
410 PRINT AT 0,1; INK 7; PAPER
0;"KLMNO": INK 5: PAPER 1: PRINT
 OVER 1;AT 2,2; INK 0; PAPER 7;"
EFG";AT 3,2;"HIJ";AT 4,2; INK 5;
 PAPER 1;"   "
415 INK 7: PRINT AT 21,1; PAPER
0;"KLMNO";AT 21,26;"KLMNO";AT 0,
26;"KLMNO"
417 PRINT AT 10,12; PAPER 0;"TU
TU TU"
419 PRINT AT 11,12; PAPER 0;"TU
TU TU"
425 PAPER 0
460 RANDOMIZE USR 42144
470 RANDOMIZE USR 42100
480 RANDOMIZE USR 40000
9996 SAVE "Impulse" LINE 0
9997 SAVE "Impcode2"CODE 40000,2
200
9998 SAVE "Impcode3"CODE 64000,1
535
9999 GO TO 9996
```

Enter listing 2 using the hex loader program, listing 4 then save the code straight away using the command:

SAVE "Impcode2" CODE 40000,2200

Enter listing 3 and then save the code straight away using the command:

SAVE "Impcode3" CODE 64000,1535

then type in the Basic program, listing 1. Do not run the Basic program until you have saved it to tape. Use the command:

SAVE "Impulse" LINE 0

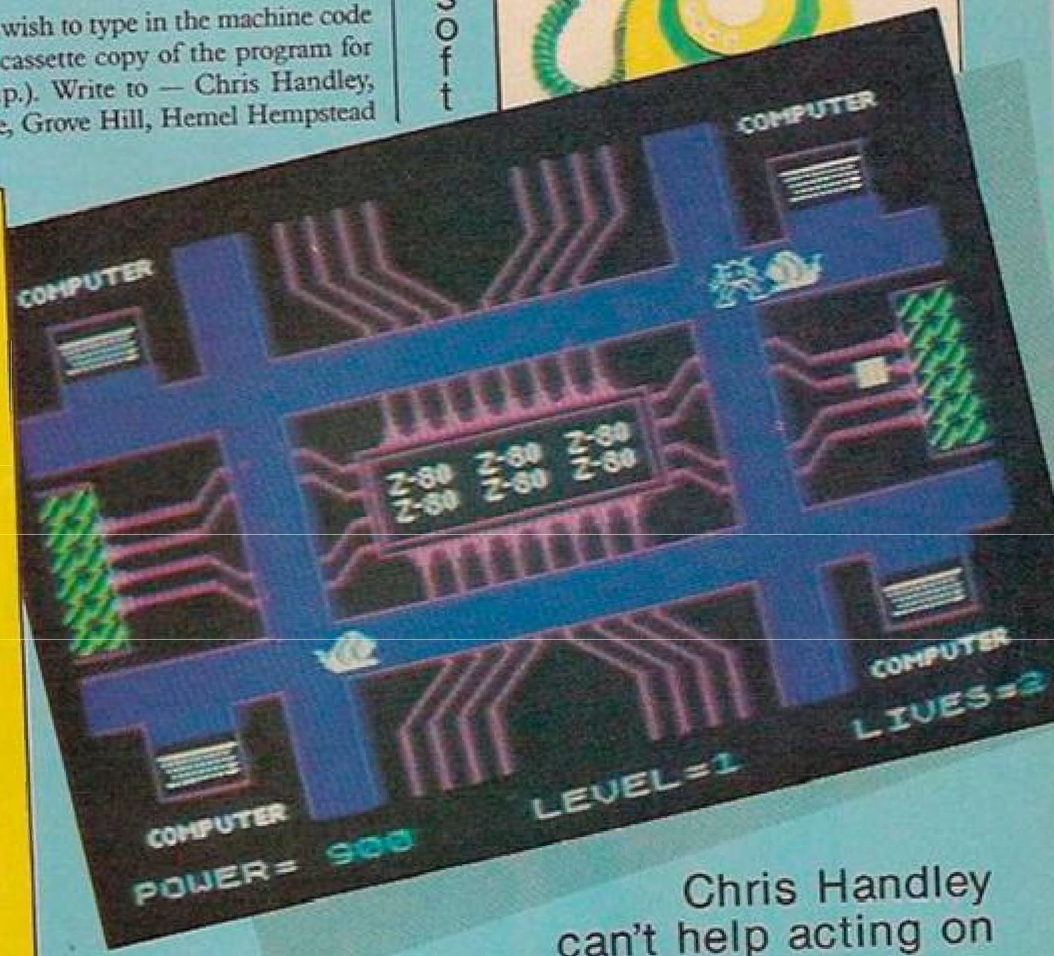
Once this is done you may run the basic program.

This will load the two block of code — previously saved — into memory and, all being well, you should get a message saying "press any key to start".

If you do not wish to type in the machine code I can supply a cassette copy of the program for just £3. (inc p.p.). Write to — Chris Handley, 22 Avon Square, Grove Hill, Hemel Hempstead HP2 6DZ.

On Telsoft





Chris Handley can't help acting on Impulse for the Spectrum.

```
[illegible]
```

```
64768  9AFEFE022805CB01 = 911
64776  3D20FE7119DDCB09 = 1091
64784  FEC9DD340900DDCB = 1163
64792  027E2810 3AA3FEFE = 912
64800  00283FDD1BE0C2811 = 562
64808  3038181 13A6AFEDD = 923
64816  860C3298EFE3AA3FE = 1084
64824  DD8600FEFF2823DD = 1173
64832  BE14081EDDCB037E = 849
64840  20083AA4FEFEAF30 = 993
64848  40C93AA4FEDD960E = 1125
64856  3CFE002834FEE030 = 884
64864  30C9DDCB09CEDDCB = 1304
64872  0546200D3AFDDCB02 = 924
64880  7E20053EFFDD960D = 864
64888  32A3FEDDCB054E20 = 1006
64896  06AF3291FE18ED3A = 901
64904  8CFEED443328CFE18 = 1167
64912  63DDCB09C6DDCB05 = 1239
64920  4620243EAFDDCB03 = 802
64928  7E28053EFFDD860E = 857
64936  32A4FEDDCB054E20 = 1007
64944  05AF3291FEC93A8D = 1029
64952  FEED443280FEC93A = 1263
64960  A4FEFEB0C8C650DD = 1563
64968  CB037E28020C6032 = 718
64976  A4FEC921E0FE110F = 1114
64984  000808C5D5E5E5DD = 1103
64992  E1DDCB0845200BDD = 991
65000  CB0CFEE1D1C11910 = 1137
65008  EAC9DDCB007E2825 = 1080
65016  CD5DFEDD3618010D = 1057
65024  27FCDDCB097E280A = 900
65032  DDCB06462004DD36 = 811
65040  07003A6EFE3296FE = 915
65048  DDE5E1D1C1C5D5ED = 1724
65056  B018C9DD350C20C3 = 913
65064  DD7E07FE0028C9FE = 1103
65072  FF2803DD3507CD5D = 877
65080  FE3A8AFEDD860232 = 1111
65088  A3FE3A8BFEDD8603 = 1226
65096  32A4FEDD3618000D = 972
65104  27FCDD12FD2AA3FE = 1226
65112  228AFE139E118AFE = 1017
65120  010F000D5CDE1ED80 = 1088
65128  09F3F5C5D5E5DDE5 = 1778
65136  CDD3FDDE1E1D1C1 = 1742
65144  F1C33800 3E09ED47 = 871
65152  ED5EC93E3EED56ED = 1216
65160  47C9B637FE000201 = 766
65168  01FF01000 40FA0210 = 589
65176  0F0002050 0280602 = 263
65184  5EFA01E637000000 = 582
65192  0000000000000000 = 0
65200  D687020000101 01FF = 609
65208  010000FA01100F5A = 373
65216  870200002010 1FF01 = 397
65224  0020FA02100FB637 = 652
65232  FE00020101FF0100 = 514
65240  40FA02100FB84E00 = 609
65248  04010101FF000060 = 358
65256  FA81100F3880 00FD = 859
65264  010101FF000080FA = 764
65272  81100F2A87030002 = 342
65280  0101FF0030A0FA81 = 924
65288  100F503702000201 = 171
65296  01FF00000 0FA6110 = 643
65304  0FB69A00FE010101 = 610
65312  FF0000E0FA81100F = 889
65320  EB501617000AD718 = 829
65328  B133607005000B02 = 707
65336  DB024000DE512200 = 635
65344  DD5100025C0EC057 = 701
65352  710EE605CD05C61E = 800
65360  26FC761603130003E = 519
65368  80C0F8FFFFF8C080 = 1646
65376  01031FFFFF1F0301 = 580
65384  181818 3C3C3C7EFF = 633
65392  FF7E3C3C3C181818 = 633
65400  FFFFFFFFF80FFD5FF = 1871
65408  FFFFFFFFF00FF55FF = 1615
65416  FFFFFFFFF01FF57FF = 1618
65424  EAFFF5FFCAFFFFFF = 1956
65432  AAFF55FFAAFFFFFF = 1700
65440  ABFF53FFA3FFFFFF = 1692
65448  0033444444330000 = 306
65456  002286AAA2220000 = 582
65464  00E494E484830000 = 867
65472  00BE888888080000 = 606
65480  00EE89EE8AE90000 = 984
65488  00F9222223220000 = 386
65496  008E494EC8480000 = 565
65504  0078407840780000 = 488
65512  0C183163C78E1C38 = 609
65520  00F01026408 0F000 = 725
65528  0062956595956200 = 744
```

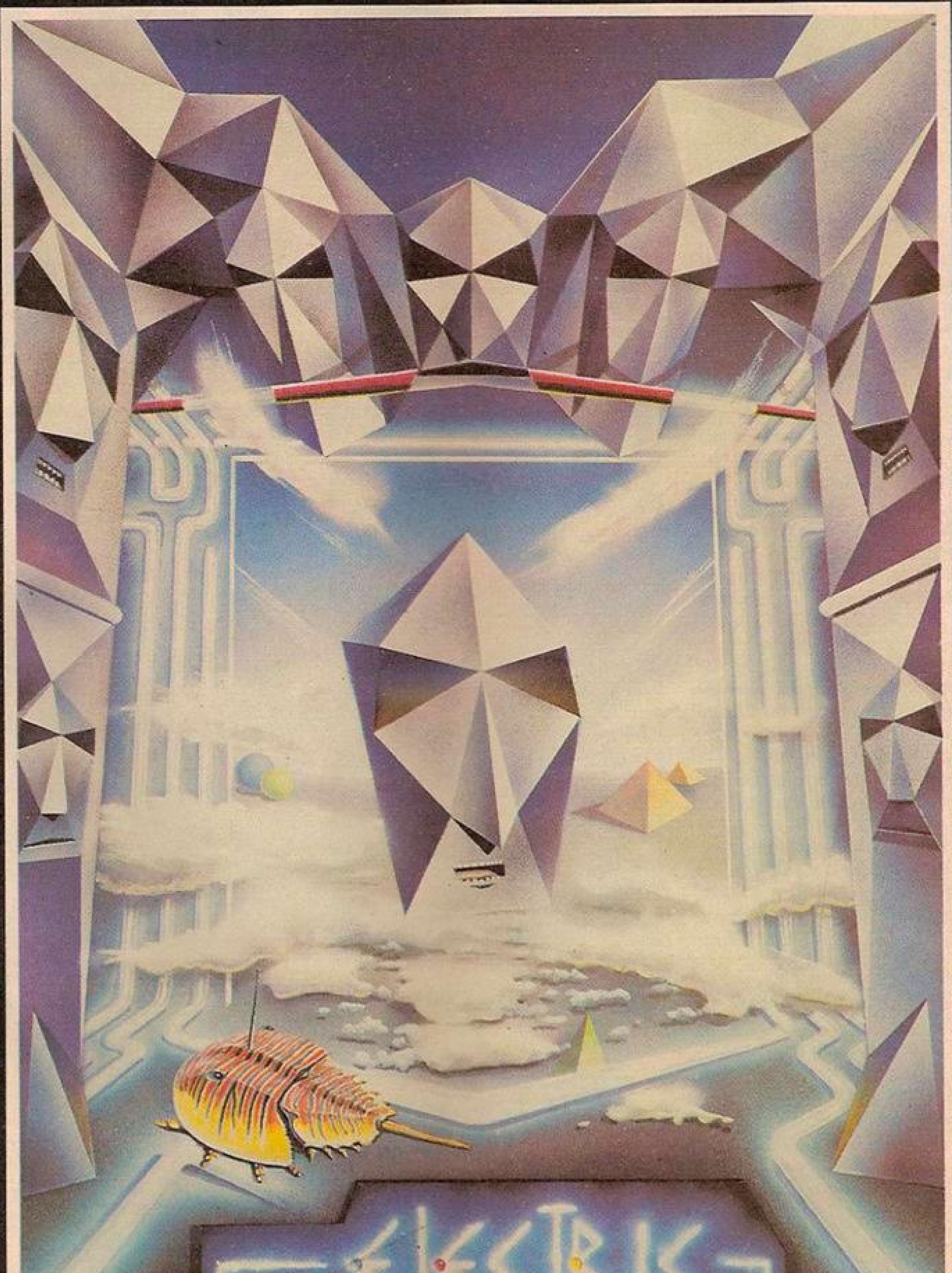
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MELOD

Melody Master is a music utility program written in Basic and machine code for the 48K Spectrum.

Tunes are entered in two parts, the notes and the rhytym. To demonstrate the features of the program, I will take you through the entering and editing of a simple tune — "Oh when the Saints". If you haven't already typed Run, do so now.

Notes may be entered by ear — using a screen keyboard — or from music sheets — using a screen stave display. First, I shall describe how to use the screen keyboard — a summary of all the keys used to enter and edit a tune can be displayed on the screen at any time by pressing and holding down key H.

After typing Run and clearing the opening display, you should see a big keyboard at the top of the screen with an arrow beneath it. This arrow is used to select notes from the keyboard and is moved left and right with the cursor keys, 5 and 8.

The first note of the tune is a C, so move the arrow using the cursor keys — so it points to note C in the middle of the screen — i.e. key 13 in the diagram. Now, press Enter. This enters the note into memory. Underneath the keyboard there should now a line reading: NOTE 002 TUNE 1.

Note is the note in the tune you are currently working on (1-199) and Tune is the tune you are working on (1-5).

The next note is an E, so move the arrow up the keyboard to the E key (key 17 in diagram) and press Enter. Now enter the rest of the notes using the table in diagram 1.

You will have noticed a stave in the bottom left hand corner of the screen. This allows you, if you wish, to enter the tune from written music sheets rather than by ear. To turn the stave on and off, press 1.

When you've finished entering the notes in diagram 1, you should be on Note 34. If you're familiar with the tune, you may have noticed that Note 19 is wrong. This was deliberate to provide an example of the editing facilities. It should have been a D — key 15 in diagram. To correct this you must get Note to equal 19. This is done with the cursor keys 6 and 7. Key 7 will increase Note; 6 will decrease Note.

So, using key 6, backstep Note to equal 19. Now, to change the wrong note to a D, just move the arrow up the keyboard to the D key — 15 in diagram — and press Enter. You should now have a good idea of how to correct a known mistake. Now, try experimenting by changing a note and changing it back.

You will have noticed that each time you press 6, the arrow jumps about. This is because whenever you change Note, the arrow will point to the current contents of that Note.

You can also delete and insert notes. If you




```
  10 GO TO 260
  20 IF USR 53226 50 THEN GO TO
20
  30 RETURN
  40 IF USR 53226 50 AND USR 530
56=255 THEN GO TO 40
  50 RETURN
  60 IF USR 53303 255 THEN GO T
O 60
  70 RETURN
  80 IF USR 53303=255 THEN GO TO
 80
  90 RETURN
 100 LET A=START  IF PEEK A=255
THEN LET Z=33  RETURN
 110 GO TO 150
 120 LET NCO=1  DIM N(200,2)  LE
T PI=((PS+1) 2
 130 LET PI=PEEK A  LET DU=PEEK
(A+1)+(256*PEEK (A+2))  IF DU=65
535 THEN RETURN
 140 LET DU=(DU 50) PC  IF DU 10
 THEN RETURN
 150 LET N(NCO,1)=PI  LET N(NCO,
2)=DU  LET NCO=NCO+1  LET A=A+3
 GO TO 130
 160 GO SUB 190  PRINT AT 9,10
INK 4 "PLEASE WAIT"  GO SUB 120
 IF NCO=1 THEN GO TO 230
 165 LET NOT=1  PRINT AT 9,8  IN
K 4 "(ANY KEY TO EXIT)"
 170 BEEP N(NOT,2) N(NOT,1)  LET
 NOT=NOT+1  IF NOT NCO AND USR
53056=255 THEN GO TO 170
 180 GO TO 230
 190 PRINT AT 14,15  PAPER 1
 200 POKE 53153,127  POKE 53156
13  POKE 53155,0  POKE 53158,12
 POKE 53159,9  LET US=USR 53152
 210 PRINT AT 17,14
              PRINT AT 8,0  INK 0  O
VER 1
 220 RETURN
 230 LET UD=1  GO SUB 1740  PRIN
T AT 10,0  OVER 1  INK 6  AT 9,0
  INK 0
 240 POKE 53153,120  POKE 53156
13  POKE 53155,0  POKE 53158,12
 POKE 53159,9  LET US=USR 53152
 250 RETURN
 260 POKE 23658,8  BORDER 0  PAP
ER 0  INK 0  BRIGHT 1  FLASH 0
OVER 0  INVERSE 0  CLEAR 49999
 270 GO TO 1190
 280 PAPER 1
 290 GO SUB 640  LET PI=PEEK ADD
R  IF PI=255 THEN PRINT AT 14,15
 "              " GO TO 390
 300 LET M$="BEEP "
 310 LET DU=PEEK (ADDR+1)+(256*P
EEK (ADDR+2))  IF DU=65535 THEN
LET N$="*,"  GO TO 360
 320 LET DU=(DU 50) ((PS+1) 2)
 330 LET N$=STR$ DU
 340 IF LEN N$ 5 THEN LET N$=N$(
TO 5)
 350 LET N$=N$+", "
 360 IF PI 9 THEN LET N$=N$+"0"
 370 LET M$=M$+N$+STR$ PI
 380 PRINT AT 14,15  INK 6 S$(PI
+1)  INK 5 "              " AT
14,31-LEN M$ M$
 390 PAPER 0  RETURN
 400 LET PO1=x(INT ((A(OL+1)+1)/
2),1)  LET SH1=((A(OL+1)/2)<>INT
 (A(OL+1)/2))  LET POS1=x(INT ((
A(OL+1)+1)/2),2)
 410 LET PO2=x(INT ((A(NO+1)+1)/
2),1)  LET SH2=((A(NO+1)/2)<>INT
 (A(NO+1)/2))  LET POS2=x(INT ((
A(NO+1)+1)/2),2)
 420 LET P1=(PO1-(4*POS1))  LET
P2=(PO2-(4*POS2))  IF P1=P2 AND
SH1=SH2 AND POS1=POS2 THEN RETUR
N
 430 RANDOMIZE 56 AND P1=(151+PO
S1)+USR 53310
 440 IF SH1=1 THEN RANDOMIZE 48
AND P1=(148+POS1)+USR 53310
 450 RANDOMIZE 56 AND P2=(151+PO
S2)+USR 53310
 460 IF SH2=1 THEN RANDOMIZE 48
AND P2=(148+POS2)+USR 53310
 470 RETURN
 480 LET PO=x(INT ((A(NO+1)+1)/2
),1)  LET SH=((A(NO+1)/2)<>INT (
A(NO+1)/2))  LET POS=x(INT ((A(N
O+1)+1)/2),2)
 490 RANDOMIZE 56 AND (PO-(4*POS
))=(151+POS)+USR 53310
 500 IF SH=1 THEN RANDOMIZE 48 A
ND (PO-(4*POS))=(148+POS)+USR 53
310
 510 RETURN
 520 PRINT AT 21,30;  IF PS<10 T
HEN PRINT INK 5;"0";
 530 PRINT INK 5;PS  RETURN
 540 LET TUNE=1  LET PS=1  LET S
TAV=0  GO SUB 1610  LET Z=33  LE
T CO=1  LET NO=12  LET OL=NO  LE
T UD=1  LET OLCO=CO  OUT 254,16
 GO SUB 630
 550 PRINT AT 3,0  INK 0  RAND
OMIZE ((A(OL+1)*8)-3) AND 111=14
7+USR 53310
 560 GO TO 650
 570 LET Z=USR 53056
 580 IF Z<>1 THEN GO TO 600
 590 FOR Y=1 TO 5  NEXT Y  PRINT
 #0,AT 1,0  INK 6,K$( TO 32)  LE
T K$=K$(2 TO LEN K$)+K$(1)  GO T
O 570
 600 PRINT #1,AT 1,0  INK 3,"
  COPYRIGHT T.BAKER 1985      "
 610 IF Z=254 OR Z=255 OR Z=39 O
R Z=24 THEN GO TO 570
 620 RETURN
 630 LET START=50000+(TUNE-1)*60
0  RETURN
 640 LET ADDR=START+((CO-1)*3)
RETURN
 650 IF CO>199 THEN LET CO=199
 660 GO SUB 630  GO SUB 640
 670 IF PEEK ADDR=255 AND Z=33 T
HEN GO TO 700
```

Y MASTER

Tom Baker makes beautiful music on a Spectrum!

press D, the current note will be deleted and all the other notes above it will be moved down. If you press I, then the note the arrow is pointing to will be inserted and become the current note.

For example, move Note to 12 using keys 6 and 7 and the arrow should be pointing at G. Now press D. The G will have been deleted and the arrow will be pointing at E which was the old Note 13. To get the G back, move the arrow to G and press I.

If you press 3, then Note will equal the last note in the current tune. If you press 9, then you will hear the note the arrow is pointing to. Pressing 4 will make Note equal 1. Pressing 2 will clear the current Tune and O will clear all the tunes — a safety prompt is included with 2 and 0 in case you plress them by mistake. Pressing Q will increase Tune and A will decrease Tune.

If at any time you wish to save a tune to tape, just press 9 and follow the screen prompts. To load your saved tune, press L and start the tape.

The rhythm routine is begun by pressing R, but first press 4 to make Note equal 1 as the rhythm is entered from the current Note. At any time during the rhythm routine you may press space to exit.

When you press R you are asked — 'Y'/'N' — if you wish to hear the notes as you enter the rhythm. However, listening to the tune slows the routine and is only recommended for practising.

Once you have press Y or N you will be asked to enter the rhythm. This is done by tapping the rhythm on any key — except space. The last note has to be held down for the right length of time.

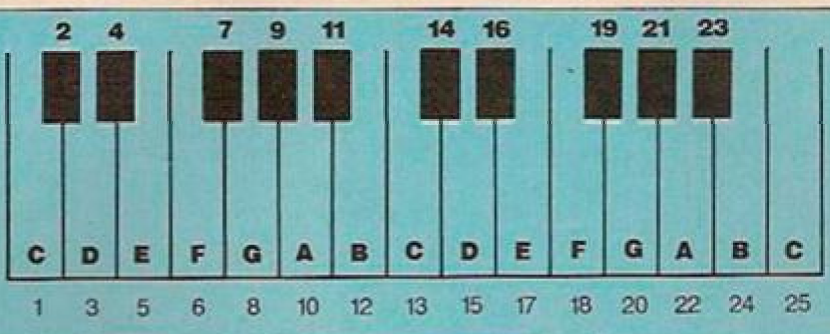
If you are entering the rhythm from the keyboard make sure you first disconnect the cassette lead and other peripherals like a printer.

There is another way of entering the rhythm that was intended mainly for fun but, as it uses a tape recorder and as not all makes of recorder are suitable, I can't guarantee its success with your equipment. Set up your tape recorder as follows: connect a lead from the ear socket of the computer to the ear socket of your tape recorder, insert a blank tape and set it to record.

Some tape recorders output what they are recording through their 'ear' socket so, when set up like this, your tape recorder can effectively listen to any noise in the room and pass information about it to your Spectrum. Now you can clap or whistle the rhythm into the computer.

When you've entered the rhythm, you can hear the complete tune by pressing P. At the bottom right of the screen is a message "Playback speed 01". this is the speed at which the tune is played back and can be altered with keys T and G. Speed 1 is the slowest; 10 the fastest.

If you find that the rhythm routine is not as responsive as it should be, change line 2140 to read: 2140 GOTO 2130.



Note	Key	Note	Key	Note	Key
1	13C	12	20G	23	20G
2	17E	13	17E	24	20G
3	18F	14	13C	25	18F
4	20G	15	17E	26	18F
5	13C	16	15D	27	17E
6	17E	17	17E	28	18F
7	18F	18	17E	29	20G
8	20G	19	12B	30	17E
9	13C	20	13C	31	13C
10	17E	21	13C	32	15D
11	18F	22	17E	33	13C

```
 680 IF PEEK ADDR=255 THEN LET C
O=CO-1+(CO<>1): GO TO 650
 690 LET NO=PEEK ADDR
 700 LET C$="": IF CO<100 THEN L
ET C$="0": IF CO<10 THEN LET C$=
"00"
 710 LET C$=C$+STR$ CO
 720 PRINT AT 10,13; INK 7;C$;AT
 10,22;TUNE
 730 IF STAV=1 THEN GO SUB 400
 740 IF OL<>NO THEN RANDOMIZE (U
A(OL+1)+8)-3) AND 111=147+USR 53
310: RANDOMIZE ((A(NO+1)+8)-3) A
ND 111=147+USR 53310
 750 IF UD=1 THEN GO SUB 260
 760 LET UD=0
 770 PRINT AT 8,0; INK 2; OVER 1
;: LET OLCO=CO
 780 GO SUB 570
 790 LET OL=NO
 800 IF Z<>19 AND Z<>4 THEN GO T
O 840
 810 LET NO=NO-(Z=19 AND NO<>24)
-(Z=4 AND NO<>0)
 820 IF NO<>OL THEN BEEP .02,0
 830 GO TO 730
 840 IF Z=3 THEN LET CO=CO-1+(CO
<>1): IF OLCO<>1 THEN LET UD=1:
BEEP .02,0: GO TO 650
 850 IF Z=30 THEN PRINT #1; INK
4;AT 1,0;"    START TAPE THEN PRE
SS ENTER    ": GO TO 1930
 860 IF Z=25 THEN PRINT #1; INK
4;AT 1,0;"             PLEASE WAIT
           ": GO TO 1950
 870 LET OPS=PS: LET PS=PS+(Z=5
AND PS<>10)-(Z=6 AND PS<>1): IF
OPS<>PS THEN LET UD=1: BEEP .02,
20: GO SUB 520: GO TO 750
 880 IF Z=20 AND PEEK START<>255
 THEN LET P=START: LET UD=1: BEE
P .02,20: LET AD=53459: GO SUB 1
600: LET CO=(USR 53458)-1: GO TO
 650
 890 IF Z=13 THEN GO TO 2260
 900 IF Z=12 AND CO<>1 THEN LET
UD=1: BEEP .02,20: LET CO=1: GO
TO 650
 910 IF Z=11 AND PEEK ADDR<>255
THEN LET CO=CO-1: GO SUB 640: BE
EP .05,NO: LET UD=1: GO TO 650
 920 IF Z=27 THEN BEEP .05,NO
 930 IF Z<>35 THEN GO TO 970
 940 BEEP .5,10
 950 PRINT #1; INK 5;AT 1,0;"DO
YOU WANT TO CLEAR ALL TUNES ?":
LET N$=INKEY$: IF N$="" THEN GO
TO 950
 960 IF N$="Y" THEN GO TO 1360
 970 IF Z=33 OR Z=18 THEN LET UD
=1: POKE 53153,30+(16*(Z=18)): P
OKE 53156,0: POKE 53155,1: POKE
53158,30: POKE 53159,8: LET US=U
SR 53152: BEEP .05,NO
 980 IF Z=33 OR Z=18 THEN POKE 5
3153,120: POKE 53156,0: POKE 531
55,1: POKE 53158,30: POKE 53159,
8: LET US=USR 53152
 990 IF Z=33 THEN GO SUB 640: PO
KE ADDR,NO: LET CO=CO+1: GO TO 6
50
1000 IF Z=18 THEN LET A=CO: LET
CO=199: GO SUB 640: LET CO=A: LE
T P=ADDR: LET AD=53029: GO SUB 1
600: LET P=(200-CO)*3: LET AD=53
037: GO SUB 1600: LET US=USR 530
28: GO SUB 640: POKE ADDR,NO: PO
KE ADDR+1,255: POKE ADDR+2,255:
LET CO=200: GO SUB 640: POKE ADD
R,255: POKE ADDR+2,255: POKE ADD
R+1,255: LET CO=A: GO TO 650
1010 LET OLT=TUNE: LET TUNE=TUNE
+(Z=37 AND TUNE<>5)-(Z=38 AND TU
NE<>1): IF OLT<>TUNE THEN LET Z=
33: LET UD=1: BEEP .02,20: LET C
O=1: GO TO 650
1020 IF Z=36 THEN BEEP .02,20: L
ET STAV=1-STAV: GO SUB 480
1030 IF Z<>28 THEN GO TO 1070
1040 BEEP .5,10
1050 PRINT #1;AT 1,0; INK 5;"DO
YOU WANT TO CLEAR THIS TUNE ?":
LET N$=INKEY$: IF N$="" THEN GO
TO 1050
1060 IF N$="Y" THEN BEEP .5,0: L
ET UD=1: GO SUB 1590: LET CO=1:
GO TO 650
1070 IF Z=22 THEN BEEP .02,-20:
GO SUB 640: LET UD=1: LET P=(200
-CO)*3: LET AD=53023: GO SUB 160
0: LET P=ADDR+3: LET AD=53015: G
O SUB 1600: LET US=USR 53014: LE
T Z=33: GO TO 650
1080 IF Z=34 THEN BEEP .02,20: G
O SUB 100: GO TO 650
1090 GO TO 780
1100 IF USR 53056=32 THEN GO TO
2240
1110 GO SUB 2230: LET AD=ADDR+1:
 POKE 23672,0: POKE 23673,0: POK
E 23674,0
1120 POKE 53225,(PEEK (AD-1)+1)
1130 GO SUB 60
1140 IF PEEK (AD+2)=255 THEN POK
E AD-1,PEEK 23673: POKE AD,PEEK
23672: GO TO 2240
1150 GO SUB 80
1160 LET INK=USR 53056
1170 IF INK=32 THEN GO TO 2240
1180 GO SUB 2230: POKE AD+1,PEEK
 23673: POKE AD,PEEK 23672: LET
AD=AD+3: POKE 53225,(PEEK (AD-1)
)+1: POKE 23672,0: POKE 23673,0:
 POKE 23674,0: GO TO 1130
1190 PRINT #1; INK 5;AT 1,11;"PL
EASE WAIT"
1200 LET IN=0: LET AD=59000: RES
TORE 1750: FOR A=1 TO 25: READ P
: GO SUB 1600: LET AD=AD+2: NEXT A
1210 REM C UDG  C
1220 DATA "C ","CC","D ","DC","E
 ","F ","FC","G ","GC","A ","AC"
,"B "
1230 DATA "C ","CC","D ","DC","E
 ","F ","FC","G ","GC","A ","AC"
,"B ","C "
```

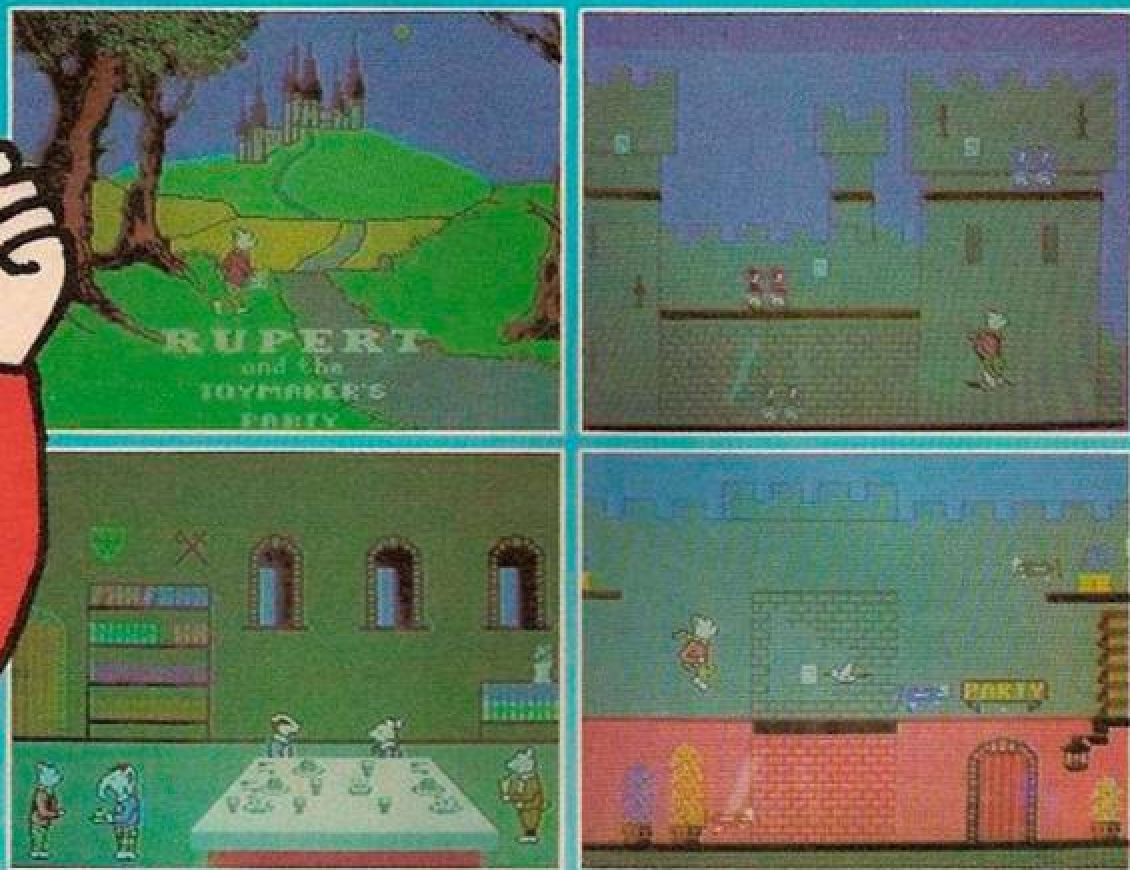
(listing continued on page 63)

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(listing continued from page 61)

```
1240 DIM S$(25,2): RESTORE 1220:
 FOR A=1 TO 25: READ S$(A): NEXT
 A
1250 LET EC=53067: LET K$=".....
.........'S' SAVE PRESENT TUNE
TO TAPE, 'L' LOAD TUNE FROM TAPE
 'R' ENTER RHYTHM, 'P' PLAY TUN
E, 'Q' TUNE UP, 'A' TUNE DOWN, '
I' INSERT NOTE, 'D' DELETE CURRE
NT NOTE, '5' MOVE ARROW LEFT, '8
' MOVE ARROW RIGHT, '1' STAVE ON
/OFF, '2' CLEAR CURRENT TUNE, '7
' FORWARD STEP THROUGH TUNE, '6'
 BACKSTEP THROUGH TUNE, '3' JUMP
 TO END OF TUNE, '4' JUMP TO STA
RT OF TUNE, 'T' & 'G' PLAYBACK S
PEED UP/DOWN, 'C' CLEAR ALL TUNE
S, '9' HEAR CURRENT NOTE, 'ENTER
' ENTER NOTE"
1260 DATA VAL "15",VAL "1",VAL "
15",VAL "0",VAL "23",PI/PI,VAL "
23",VAL "0",VAL "31",VAL "1",VAL
 "31",VAL "0",VAL "39",PI/PI,VAL
 "39",VAL "0",VAL "47",PI/PI,VAL
 "47",VAL "0",VAL "55",PI/PI,VAL
 "55",VAL "0",VAL "63",VAL "1",V
AL "63",VAL "0",VAL "71",PI/PI:
DIM X(15,2): RESTORE 1260: FOR A
=1 TO 15: READ X(A,1),X(A,2): NE
XT A
1270 DIM A(25): DATA VAL "2",VAL
 "3",VAL "4",VAL "5",VAL "6",VAL
 "8",VAL "9",VAL "10",VAL "11",V
AL "12",VAL "13",VAL "14",VAL "1
6",VAL "17",VAL "18",VAL "19",VA
L "20",VAL "22",VAL "23",VAL "24
",VAL "25",VAL "26",VAL "27",VAL
 "28",VAL "30": RESTORE 1270: FO
R A=1 TO 25: READ A(A): NEXT A
1290 LET C=0: RESTORE 1770: FOR
A=53000 TO 53473: READ B: LET C=
C+B: POKE A,B: NEXT A: IF C<>480
36 THEN PRINT AT 0,0; INK 9;"  Y
OU HAVE MADE A TYPING ERROR
  IN LINES 1910 TO 2060": BEEP 5
,-10: GO TO 2440
1300 LET US=USR 53430: RESTORE 1
390: FOR A=65039 TO 65199: READ
B: POKE A,B: NEXT A
1310 DATA VAL "15",VAL "15",VAL
"15",VAL "15",VAL "15",VAL "15",
VAL "15",VAL "15",VAL "248",VAL
"248",VAL "248",VAL "248",VAL "2
48",VAL "248",VAL "248",VAL "248
",VAL "0",VAL "40",VAL "124",VAL
 "40",VAL "124",VAL "40",VAL "0"
,VAL "0",VAL "16",VAL "56",VAL "
84",VAL "146",VAL "16",VAL "16",
VAL "16",VAL "16",VAL "0",VAL "8
0",VAL "248",VAL "80",VAL "80",V
AL "80",VAL "248",VAL "80"
1320 DATA VAL "0",VAL "80",VAL "
248",VAL "80",VAL "0",VAL "80",V
AL "248",VAL "80",VAL "255",VAL
"0",VAL "0",VAL "0",VAL "0",VAL
"0",VAL "0",VAL "0"
1330 DATA VAL "0",VAL "62",VAL "
127",VAL "255",VAL "255",VAL "25
5",VAL "254",VAL "124",VAL "0",V
AL "62",VAL "127",VAL "255",VAL
"0",VAL "255",VAL "254",VAL "124
",VAL "0"
1350 RESTORE 1310: LET T=0: FOR
A=USR "A" TO USR "I"+7: READ B:
LET T=T+B: POKE A,B: NEXT A: IF
T<>7214 THEN PRINT AT 0,0; INK 9
;"YOU HAVE MADE A TYPING ERROR I
N           LINES 1310-1350": BEE
P 5,-10: GO TO 2440
1360 LET US=USR 53000
1370 IF IN=0 THEN GO SUB 2370
1380 GO TO 540
1390 DATA 0,0,0,0,1,3,6,4
1400 DATA 0,0,0,0,192,32,16,8
1410 DATA 255,4,4,4,4,2,2,2
1420 DATA 255,8,16,16,16,32,32,6
4
1430 DATA 255,1,3,5,5,9,17,33
1440 DATA 255,128,0,0,0,0,0,0
1450 DATA 255,65,128,129,131,134
,140,136
1460 DATA 255,128,128,240,252,14
2,130,195
1470 DATA 255,136,136,132,64,64,
48,15
1480 DATA 255,65,65,66,66,66,76,
240
1490 DATA 255,0,0,0,0,12,14,7
1500 DATA 255,32,32,32,32,32,96,
192
1510 REM G UDG 'G'
1520 FOR A=16 TO 20: PRINT AT A,
1; INK 0;"GGGGGGGGG": NEXT A
1530 PRINT AT 21,6; INK 0;"GGG";
AT 15,6;"GGG";AT 14,6;"GGG"
1540 REM LOWER CASE LETTERS
1550 PRINT AT 15,1; INK 0;"ab";A
T 16,1;"cd";AT 17,1;"ef";AT 18,1
;"gh";AT 19,1;"ij";AT 20,1;"kl"
1560 POKE 53153,79: POKE 53156,1
3: POKE 53155,14: POKE 53158,18:
 POKE 53159,3: LET US=USR 53152
1570 POKE 53153,120: POKE 53156,
13: POKE 53155,0: POKE 53158,12:
 POKE 53159,9: LET US=USR 53152
1580 RETURN
1590 LET Z=33: LET NO=12: GO SUB
 630: LET P=START: LET AD=53043:
 GO SUB 1600: LET US=USR 53042:
RETURN
1600 LET P1=INT (P/256): LET P2=
P-(P1*256): POKE AD,P2: POKE (AD
+1),P1: RETURN
1610 INK 0: CLS : IF PEEK 55808<
>0 THEN POKE 53266,235: LET US=U
SR 53260: GO TO 1720
1620 REM AB UDG 'AB'
1630 FOR A=0 TO 3: PRINT AT A,2;
"ABAB  ABABAB  ABAB  ABABAB": NE
XT A
1640 FOR A=8 TO 248 STEP 16: PLO
T A-1,113: PLOT A+1,113: PLOT A,
113: PLOT A-1,174: PLOT A+1,174:
 PLOT A,174: NEXT A
1650 FOR A=20 TO 213 STEP 16: PL
OT INVERSE 1;A,144: PLOT INVERSE
 1;A+8,144: NEXT A
1660 PLOT 8,175: DRAW 240,0: DRA
W 0,-63: DRAW -240,0
1670 FOR A=24 TO 254 STEP 16: PL
OT A,113: DRAW 0,62: NEXT A
1680 FOR A=0 TO 7: PRINT AT A,0;
"█";AT A,31;"█": NEXT A
1690 PLOT 8,173: DRAW 0,-60
1700 DATA 67,68,69,70,71,65,66,6
7,68,69,70,71,65,66,67: RESTORE
1700: FOR A=12 TO 240 STEP 16: R
EAD C: RANDOMIZE A AND 122=C+USR
 53310: NEXT A
1710 POKE 53266,0: LET US=USR 53
260
1720 INK 7: GO SUB 1520: POKE 53
153,120: POKE 53156,0: POKE 5315
5,0: POKE 53158,32: POKE 53159,8
: LET US=USR 53152
1730 PRINT AT 10,6; INK 6;"NOTE
 TUNE"
1740 PRINT AT 17,14; INK 4;"PRES
S 'H' FOR KEYS": PRINT AT 21,14;
"PLAYBACK SPEED  ": GO SUB 520:
RETURN
1750 REM  --MACHINE CODE DATA--
          TAKE SPECIAL CARE WITH
             THESE LINES
1760 DATA 1642,1548,1459,1376,12
97,1222,1152,1085,1023,964,908,8
55,805,759,714,672,633,596,561,5
27,496,467,439,412,390
1770 DATA 33,80,195,54,255,229,2
09,19,1,162,11,237,176,201
1780 DATA 33,0,0,229,209,27,27,2
7,1,0,0,237,176,201
1790 DATA 33,0,0,229,209,19,19,1
9,1,0,0,237,184,201
1800 DATA 33,80,195,54,255,229,2
09,19,1,86,2,237,176,201
1810 DATA 205,142,2,40,2,30,254,
6,0,75,201
1820 DATA 1,0,255,17,0,0,219,254
,203,119,32,1,19,16,247,66,75,20
1
1830 DATA 62,21,215,62,1,215,62,
16,215,62,6,215,62,17,215,62,0,2
15,62,22,215,62,0,215,62,0,215,6
2,151,215,62,22,215,62,0,215,62,
31,215,62,151,215,62,22,215,62,7
,215,62,31,215,62,151,215,62,22,
215,62,7,215,62,0,215,62,151,215
,201
1840 DATA 62,70,1,5,3,17,25,14,3
3,223,87,213,17,32,0,4,25,16,253
,65,4,35,16,253,209,66,229,72,67
,119,35,16,252,225,213,17,32,0,2
5,209,65,16,239,201
1850 DATA 17,88,2,221,33,0,0,62,
255,205,194,4,201,17,88,2,55,221
,33,0,0,62,255,205,86,5,201
1860 DATA 201,6,1,33,118,230,17,
2,0,25,16,253,94,35,86,235,17,5,
0,205,181,3,201
1870 DATA 33,0,64,54,255,229,209
,19,1,255,7,237,176,201,33,0,64,
17,0,218,235,1,0,3,237,176,201
1880 DATA 33,0,88,6,255,126,203,
119,32,9,254,0,32,4,54,7,24,1,53
,35,16,239,201
1890 DATA 205,231,207,205,75,207
,201,205,231,207,205,64,207,201
1900 DATA 42,101,92,229,235,42,9
9,92,1,15,0,9,237,82,40,2,207,25
,205,162,45,254,128,56,11,71,214
,144,56,19,237,91,123,92,24,4,23
7,91,54,92,38,0,111,41,41,41,25,
24,6,205,56,11,33,146,92,229,221
,225,205,162,45,103,229,205,162,
45,225,111,229,14,8,225,37,229,3
6,197,68,77,205,170,34,193,71,17
5,176,221,126,0,40,17,235,38,0,1
11,62,8,144,71,41,16,253,235,126
,170,119,35,123,174,119,221,35,1
3,32,213,225,225,34,101,92,201
1910 DATA 33,0,61,17,57,252,1,0,
3,126,203,47,182,18,19,35,11,121
,176,32,244,33,57,251,34,54,92,2
01
1920 DATA 33,0,0,1,1,0,126,254,2
55,200,3,35,35,35,24,246
1930 IF USR 53056<>33 THEN GO TO
 1930
1940 LET UD=1: INPUT "": LET P=S
TART: LET AD=53201: GO SUB 1600:
 LET US=USR 53196: BEEP .5,0: GO
 TO 750
1950 LET UD=1: LET P=START: LET
AD=53215: GO SUB 1600: LET US=US
R 53209: BEEP .5,0: INK 7: GO TO
 750
1960 GO SUB 630: IF PEEK ADDR=25
5 THEN LET Z=33: RETURN
1970 IF INKEY$<>"" THEN GO TO 19
60
1980 POKE 53153,64: POKE 53156,0
: POKE 53155,0: POKE 53158,32: P
OKE 53159,9: LET US=USR 53152
1990 POKE 53250,0: LET US=USR 53
246
2000 PRINT AT 10,0; OVER 1; INK
0,,: PRINT AT 0,1; INK 4;"RHYTHM
 ROUTINE"
2010 LET B=0: FOR A=1 TO 30: PRI
NT AT 1,A; BRIGHT 0; INK B; OVER
 1;" ";AT 6,A; INK 7-B;" ": LET
B=B+1: IF B=8 THEN LET B=0
2020 NEXT A: INK 8: PLOT 18,165:
 DRAW 219,0: PLOT 18,164: DRAW 2
19,0: PLOT 18,122: DRAW 219,0: P
LOT 18,121: DRAW 219,0: INK 7
2030 PRINT AT 0,15; INK 2;" - ";
 INK 5;"SPACE TO EXIT": PRINT AT
 11,6; INK 6;"STARTING AT NOTE "
;C$: GO SUB 190: PRINT AT 2,2;"D
O YOU WANT TO HEAR THE TUNE";AT
3,3;"AS YOU ENTER THE RHYTHM  ?"
;AT 5,11; INK 6;"YES OR NO": BEE
P .5,0
2040 PRINT AT 7,3; INK 5;"PRESS
'I' FOR INSTRUCTIONS"
2050 LET US=USR 53273: LET Z$=IN
KEY$
2060 IF Z$="I" THEN GO TO 2270
2070 IF Z$=" " THEN GO TO 2240
2080 IF Z$<>"Y" AND Z$<>"N" THEN
 GO TO 2050
2090 PRINT AT 11,0,,: POKE 53223
,201: IF Z$="Y" THEN POKE 53223,
0
2100 LET US=USR 53273: IF INKEY$
<>"" THEN GO TO 2100
2110 POKE 53153,64: POKE 53156,2
: POKE 53155,2: POKE 53158,28: P
OKE 53159,4: LET US=USR 53152
2120 PRINT AT 7,0,,: PRINT AT 3,
6; INK 7;"NOW ENTER THE RHYTHM"
2130 LET US=USR 53273: IF USR 53
056<>255 THEN GO TO 1100
2140 IF USR EC<50 THEN GO TO 213
0
2150 GO SUB 2230
2160 LET AD=ADDR+1: POKE 53225,(
PEEK (AD-1)+1): POKE 23672,0: PO
KE 23673,0: POKE 23674,0
2170 GO SUB 20
2180 IF PEEK (AD+2)=255 THEN POK
E AD+1,PEEK 23673: POKE AD,PEEK
23672: GO TO 2220
2190 GO SUB 40
2200 IF USR 53056=32 THEN GO TO
2240
2210 GO SUB 2230: POKE AD+1,PEEK
 23673: POKE AD,PEEK 23672: LET
AD=AD+3: POKE 53225,(PEEK (AD-1)
+1): POKE 23672,0: POKE 23673,0:
 POKE 23674,0: GO TO 2170
2220 GO TO 2240
2230 PRINT AT 0,0;: LET US=USR 5
3085: LET US=USR 53273: LET US=U
SR 53085: RETURN
2240 POKE 53153,120: POKE 53156,
0: POKE 53155,0: POKE 53158,32:
POKE 53159,8: LET US=USR 53152
2250 PRINT AT 11,0,,: PRINT AT 1
0,0; OVER 1; INK 6,,: POKE 53266
,235: LET UD=1: LET US=USR 53260
: GO SUB 230: RETURN
2260 GO SUB 1960: GO TO 550
2270 POKE 53250,0: LET US=USR 53
246
2280 POKE 53153,68: POKE 53156,0
: POKE 53155,0: POKE 53158,32: P
OKE 53159,8: LET US=USR 53152
2290 LET X=0: LET Y=0: LET Y$="
 To enter the rhythm, tap it out
 onany key. Alternatively (FOR F
UN),   connect a lead from the e
ar socket  of the computer to th
e ear socket ofa cassette record
er, insert a blank tape and set
it to record. Now try  clapping
or humming the rhythm!": GO SUB
2330: POKE 23606,57: POKE 23607,
251: PRINT AT 9,0; INK 5;"   PRE
SS ANY KEY TO CONTINUE"
2300 IF INKEY$<>"" THEN GO TO 23
00
2310 IF INKEY$="" THEN GO TO 231
0
2320 PRINT AT 9,0,,: GO TO 1960
2330 LET X1=Y+7: LET Y1=175-(X+8
): POKE 23606,0: POKE 23607,60
2340 FOR L=1 TO LEN Y$: RANDOMIZ
E X1 AND Y1=CODE Y$(L)+USR 53310
2350 LET X1=X1+7: IF X1>248 THEN
 LET Y1=Y1-8: LET X1=0
2360 BEEP .01,40: NEXT L: RETURN

2370 LET IN=1: CLS : PRINT AT 0,
0;" TUNES ARE ENTERED IN TWO PAR
TS""""           1.   THE NOTES"""
"          2.  THE RHYTHM""""""THE
N PRESS 'P' TO HEAR YOUR TUNE";A
T 21,0;"       ANY KEY TO CONTINU
E"
2380 OVER 1: INK 6: LET O=0: GO
SUB 2420: PRINT AT 0,0;,,: LET O
=1: PAUSE 2: GO SUB 2420: PRINT
AT 2,0;,,,,,,: GO SUB 2430: PRIN
T AT 7,0; INK 4,,: PAUSE 25: PRI
NT AT 21,0; INK 5,,: BEEP .1,14
2390 LET A=0: OVER 0: INK 7
2391 LET A=A+1: IF INKEY$="" AND
 A<>500 THEN GO TO 2391
2395 IF A=500 THEN INK 0: GO TO
2370
2400 RETURN
2410 OVER 0: INK 7: STOP
2420 LET M=O*12: BEEP .266,21-M:
 BEEP .24,23-M: BEEP .253,19-M:
BEEP .52,16-M: BEEP .24,18-M: BE
EP .346,14-M: RETURN
2430 BEEP .266,-3: BEEP .24,-1:
BEEP .253,-5: BEEP .52,-8: BEEP
.28,-6: BEEP .26,-8: BEEP .26,-9
: BEEP .38,-10: RETURN
2440 BEEP 1,0: PAPER 7: INK 0: B
ORDER 7: BRIGHT 0: CLS : STOP
9998 REM TYPE 'RUN 9999'
          TO SAVE+VERIFY
9999 PRINT #1;AT 1,0; INK 9;"  S
TART TAPE THEN PRESS ANY KEY ":
PAUSE 0: POKE 23736,181: SAVE "M
USIC" LINE 10: BEEP 1,0: INK 0:
VERIFY "": INK 7: BEEP 1,20
```

■

MICRODRIVE UTILITIES

SPECTRUM

ALTHOUGH THE Microdrive has been in widespread use with the Spectrum for well over a year now, very little software utilising the Microdrive has been published. The one kind of routine which has received exposure is the extended Cat, which gives information on the length and type of the files on a cartridge. The programs in this article deal with the Microdrive in a more sophisticated way.

The first two programs make up a secure saving system. Files which are saved from the first program can only be loaded using the second. Protected files cannot be seen on a normal Cat, extended Cat programs reveal no valid information, and the files cannot even be erased normally. The third program is of more widespread application — it eliminates the tortuous syntax of the normal Microdrive commands, enabling you to load a file with an expression as simple as

*LOAD "FILENAME"

All of the new functions are implemented in the form of new Basic commands so there are no Pokes required in operation. All of the commands are made up of a command word preceded by a star, and followed by various parameters. None of the new commands are keywords, and so they must be typed out letter by letter.

Before you can enter a line containing one of the new commands you will have to make one USR call to insert the new command interpreter. The address to call is different for each program and is given in the paragraph describing the program. This USR call will have to be placed at the start of any program which uses the new Basic, and will need to be re-executed after any New. All of the major listings are given in the form of a hex dump which is designed for use with the hex loader given in listing 1.

The task of programming was complicated by the fact that there are at least two different shadow Rom programs in existence. I have therefore given two listings for each of the major programs. To find out which version of the shadow Rom you have in your Interface 1, type in the bytes from listing 2 using the hex loader. When you have finished type

Listing 1.

```
  10 REM ************************
  20 REM **     HEX  LOADER    **
  30 REM ** by Jon Ellis 1985 **
  40 REM ************************
  50 INPUT "Start:";S,"Finish:";
E
  60 FOR F=S TO E STEP 8
  70 PRINT F;
  80 LET CHECK=0
  90 INPUT "Enter bytes:"; LINE
H$
 100 IF LEN H$<>16 THEN PRINT "E
rror in length": BEEP .2,0: GO T
O 70
 110 PRINT TAB 8;H$;
 120 FOR G=1 TO 8
 130 LET BYTE=16*(CODE H$(1)-48-
(7 AND H$(1)>"9"))+(CODE H$(2)-4
8-(7 AND H$(2)>"9"))
 140 POKE F-1+G,BYTE
 150 LET CHECK=CHECK+BYTE*G
 160 LET H$=H$(3 TO )
 170 NEXT G
 180 INPUT "Enter check digit:";
 LINE C$
 190 IF LEN C$<>1 THEN GO TO 180
 200 PRINT TAB 27;" > ";C$
 210 LET DIGIT=CHECK-9*INT (CHEC
K/9)
 220 IF DIGIT<>VAL C$ THEN PRINT
 "Error in string - input again"
: BEEP .2,-12: GO TO 70
 230 NEXT F
```

Listing 2.

```
40000:   CF31214A9C22ED5C  > 2
40008:   CF32E1E13A3A0CFE  > 1
40016:   FB2811FEFE2818CD  > 0
40024:   7A9C11979C010B00  > 8
40032:   CD3C20C9CD7A9C11  > 7
40040:   A29C010B0018F1CD  > 5
40048:   7A9C11AD9C010B00  > 5
40056:   18E6CD0007010C00  > 0
40064:   FDCB0266118B9CCD  > 1
40072:   3C20C9596F752068  > 3
40080:   61766520616E2075  > 0
40088:   6E6B6E6F776E2052  > 2
40096:   4F4D697373756520  > 8
40104:   3120524F4D697373  > 4
40112:   7565203220524F4D  > 6
```

Listing 3A.

```
64280:  CF312121FB22B75C > 7
64288:  C9D71800FE2A2803 > 0
64296:  C3F0012A5D5C22C9 > 1
64304:  5CDD213CFF0E0228 > 8
64312:  C95C225D5C0604D7 > 7
64320:  2000DDAE00250EEE > 6
64328:  20250A581603DD19 > 2
64336:  0D20E41603D02310 > 2
64344:  E679FE02200B2191 > 3
64352:  FBE5180421FCFCE5 > 4
64360:  D72000DD0212FFDD > 6
64368:  360080D7FB24FDCB > 8
64376:  01762814DDCB00C6 > 5
64384:  FE3820A4D72000D7 > 7
64392:  FB24FDCB01762098 > 6
64400:  C9FECA2828FEAF28 > 1
64408:  19FEAA2027DDCB00 > 0
64416:  0E2100182232FF21 > 8
64424:  00402234FFD72000 > 6
64432:  1812DDCB00CED779 > 6
64440:  1CFE2C2007DDCB00 > 5
64448:  06D7811CCDB70500 > 9
64456:  CB0056200 7D7991E > 8
64464:  ED4330FFDDCB004E > 6
64472:  281400CB005E200E > 2
64480:  D7991EED4333FFD7 > 2
64488:  991EED4334FFCD0F > 1
64496:  FFDDCB004E280EED > 6
64504:  5B32FF2A34FF1930 > 3
64512:  2ECD5E12052A30FF > 7
64520:  DDCB005E20211110 > 6
64528:  27A7ED5230EB2A53 > 6
64536:  5C2234FFED5B595C > 7

64544:  37EBED522232FF2A > 6
64552:  4B5CED522236FF2A > 7
64560:  38FF110A00A7ED52 > 5
64568:  3802E70321E65C3A > 7
64576:  2FFF77ED5B32FFCD > 3
64584:  EAFDED5B34FFCDEA > 0
64592:  FDED5B30FFCDEAFD > 6
64600:  ED5B36FFCDEAFDCD > 7
64608:  CDFE3AD65CCDF717 > 0
64616:  DBEFE6012002E70E > 7
64624:  2A34FF22E45CCD61 > 0
64632:  FEDDCB18462005CD > 0
64640:  A912E70CDDCB43D6 > 5
64648:  DD7E19CDF717DDE5 > 0
64656:  E111520019E621E6 > 7
64664:  5C010900DD7100ED > 7
64672:  B0D5210900ED4B32 > 6
64680:  FF09CB3C24E5CD38 > 5
64688:  1DE17B8C3002E70F > 7
64696:  D12AE45CED4B32FF > 6
64704:  78B12822DD7E0CFE > 0
64712:  02200FE5C5CDF3FD > 1
64720:  C1DDE5E111520019 > 2
64728:  EBE1EDA0DD340B20 > 6
64736:  DFDD340C20DADDCB > 0
64744:  43CECDF3FDAFCDF7 > 7
64752:  17CDC410D9215827 > 2
64760:  D9C3C105CDB705CD > 0
64768:  0FFFCDCDFECDEB0F > 3
64776:  DD7E19CDF717DBEF > 3
64784:  E6012002E70EDDE5 > 4
64792:  E111520019E5D113 > 1
64800:  011F003600EDB03E > 0
64808:  FFDD770D01FB04ED > 5

64816:  43C95CCD1213286A > 8
64824:  CDF1FEDDE5E11143 > 2
64832:  0019CDA318010E00 > 2
64840:  CD50FE2037DDCB43 > 7
64848:  462031007E43DDB6 > 7
64856:  46E6022005CDFE12 > 7
64864:  1822DDE5E1114700 > 2
64872:  19010A00CD1E1320 > 4
64880:  13CD061378B677DD > 1
64888:  CB434E2807DD7E44 > 8
64896:  3CDD770DDDE5E111 > 7
64904:  5200191E000E207E > 0
64912:  2306081F30011C10 > 0
64920:  FA0020F3CD7E0D08 > 4
64928:  2091CD3E1ECDF1FE > 2
64936:  CD06132223E5C53E > 6
64944:  E6D3EF016801CDFA > 6
64952:  18DDE5E111370019 > 4
64960:  CD78183EEED3EFCD > 0
64968:  FE12C1E1782FA677 > 4
64976:  DDE5E11152001906 > 3
64984:  207EB720C02310F9 > 0
64992:  AFCDF717CDC410C3 > 8
65000:  C10523C000CB0272 > 7
65008:  2373C9CD64122009 > 0
65016:  CDC410AFCDF717E7 > 2
65024:  0FDDE5060ADD7E0E > 1
65032:  DD7747DD2310F6DD > 7
65040:  E1DD4E0BDD7145DD > 2
65048:  7E0CDD7746DD7E0D > 0
65056:  DD7744DDE5E11143 > 8
65064:  0019010E00CD50FE > 7
65072:  110F0019010002CD > 6
65080:  50FEDDE5E1114700 > 3

65088:  CD7512110000DD73 > 4
65096:  0BDD720CDD340DC9 > 8
65104:  E51E0078AE23085F > 7
65112:  78B120F77BBE77E1 > 6
65120:  C9CDE80FE5DD7E19 > 6
65128:  CDF71701FF00ED43 > 3
65136:  C95CCDA0FE301A28 > 4
65144:  15DDCB1866DDE5E1 > 6
65152:  11520019010002CD > 5
65160:  50FE2812E711CDFE > 5
65168:  12CD121320DCDDCB > 7
65176:  438EDDCB4396E1C9 > 7
65184:  CDF1FE111B0019CD > 2
65192:  A918DDCB4346201B > 7
65200:  DD7E43DDB646E602 > 5
65208:  C8DDE5E111470019 > 5
65216:  0E0ACD1E1320043E > 5
65224:  FFB7C937C9060A21 > 2
65232:  44FFE522DC5C3620 > 6
65240:  2310FBE1360023ED > 0
65248:  5B3AFFEBED4B38FF > 3
65256:  EDB0210A0022DA5C > 8
65264:  C9DDE5E111280019 > 1
65272:  CDA318CD41132808 > 1
65280:  010E00CD50FE20E9 > 1
65288:  DDCB204628E3C9D7 > 1
65296:  F12BED4338FFED53 > 3
65304:  3AFFDDCB00462008 > 5
65312:  D7941E32D65CFE09 > 7
65320:  D8E7043E0118F400 > 5
65328:  0000000000000000 > 0
65336:  0000000044554050 > 4
65344:  5749504520202020 > 6
65352:  2020202020200000 > 6
```

Listing 4A.

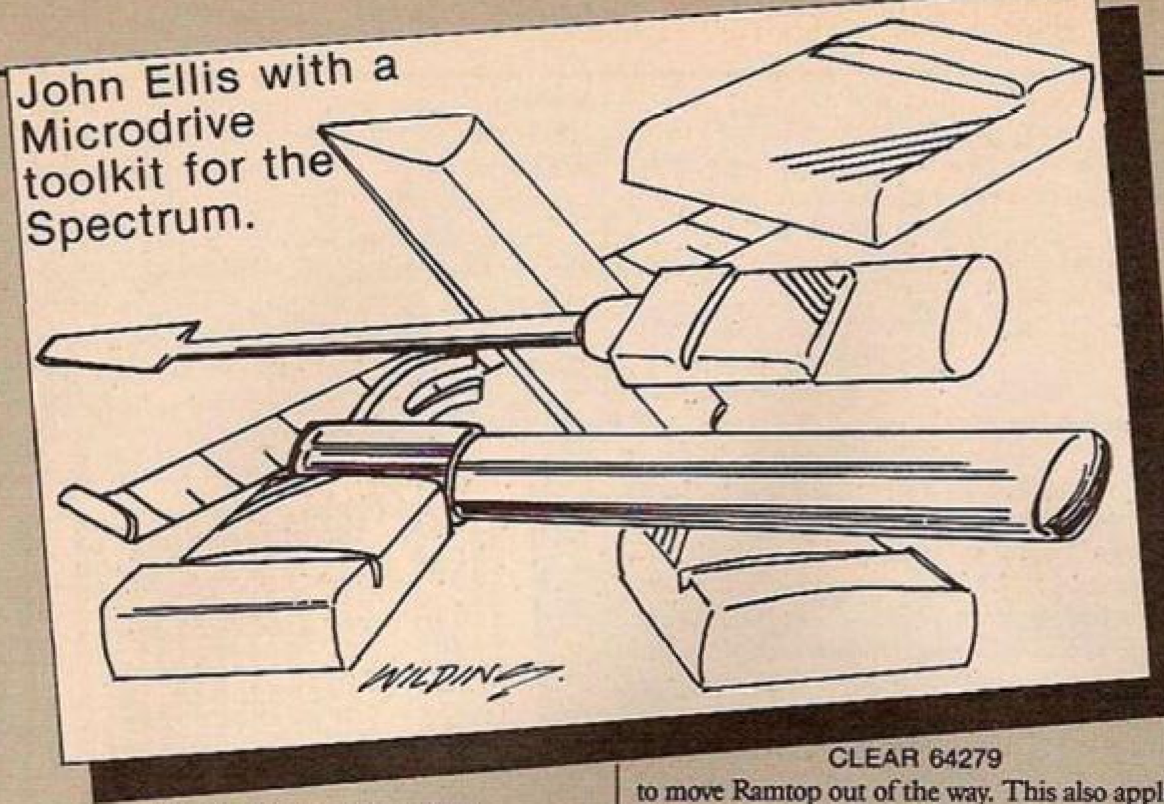
```
64445:  CF3121C6FB22B75C > 1
64453:  C9D71800FE2A2803 > 0
64461:  C3F0010604DD2141 > 0
64469:  FFD72000DDAE0028 > 1
64477:  04EE2020EBDD23D7 > 4
64485:  200010F0DD2132FF > 8
64493:  DD360000D7FB24FD > 2
64501:  CB01762814DDCB00 > 2
64509:  C6FE3B20CBD72000 > 3
64517:  D7FB24FDCB017620 > 7
64525:  BFCDB705D7F12BED > 2
64533:  433BFFED533DFFDD > 4
64541:  CB0046280BD7941E > 2
64549:  323FFF18043E0118 > 8
64557:  F73A3FFF32D65CFE > 4
64565:  093802E704DDCB00 > 2
64573:  4E2A3DFFED4B3BFF > 8
64581:  79D60938060E09ED > 2
64589:  433BFF1146FFAF18 > 1
64597:  1213EDB02145FF22 > 3
64605:  DC5C2A3BFF2322DA > 3
64613:  5C2A7B5CE521CAFE > 5
64621:  227B5C3A485CE638 > 5
64629:  FE183004F6021802 > 4
64637:  F644FD7755FDCB02 > 2
64645:  C6011800111AFFD7 > 4
64653:  3C20D74D0DE12278 > 6
64661:  5CFDCB0286FDCB7C > 2
64669:  CEFDCB7CE6CD23FE > 3

64677:  DDCB18462802E711 > 1
64685:  DDE5E11152001911 > 1
64693:  E65C010900EDB0ED > 8
64701:  5BE75C2133FFCD09 > 5
64709:  FEED5BE95CCD09FE > 3
64717:  ED5BEB5CCD09FEED > 0
64725:  5BED5CCD09FE3AE6 > 4
64733:  5C3232FFCB4F205E > 2
64741:  CB5F205AED5B535C > 0
64749:  2A595C37ED52ED5B > 1
64757:  33FFEB37ED523809 > 0
64765:  11050019444DD705 > 8
64773:  1FED5B535C2A595C > 4
64781:  2BD7E519ED4B33FF > 0
64789:  2A535CD7551623ED > 1
64797:  4B09FF09224B5C3A > 0
64805:  32FFCB57280A2A37 > 0
64813:  FF22425CFD360A00 > 1
64821:  2A535CED5B33FF2B > 2
64829:  22575C2318072A35 > 1
64837:  FFED5B33FFCD7AFD > 1
64845:  CDA912ED7B3D5CFD > 1
64853:  3600FF21F41BDF28 > 2
64861:  03217D18CD0007FD > 5
64869:  367C003A32FFCB4F > 2
64877:  2002E5C9CB5728FA > 7
64885:  2A37FF18F57AB3C8 > 0
64893:  22E95CED5B33FF21 > 7
64901:  080019CB3C247C32 > 6

64909:  E75CCD1316110900 > 4
64917:  DD6E45DD6646DDE5 > 0
64925:  E1115B0019ED5BE9 > 8
64933:  5C181ACDE1FDDD7E > 8
64941:  44B728F7173D571E > 1
64949:  F72AE95C19EBDDE5 > 3
64957:  E101520009D9CDDA > 4
64965:  1220E07EB077D9DD > 1
64973:  4E45DD4646EDB03A > 1
64981:  E75C3D32E75C20CB > 6
64989:  CD2D16C901FB04ED > 1
64997:  43C95CCD6BFE3815 > 8
65005:  2813CDDA12200EDD > 5
65013:  E5E1115200190100 > 0
65021:  02CD12FEC8CD1213 > 3
65029:  20E1E711CB0BCB02 > 8
65037:  72237323C9E51E00 > 0
65045:  7BAE23085F78B120 > 7
65053:  F77BBE77E1C9CDE8 > 6
65061:  0FE5DD7E19CDF717 > 3
65069:  01FF00ED43C95CCD > 1
65077:  6BFE3823281EDDCB > 1
65085:  1866DD7E44B7200F > 1
65093:  DDE5E11152001901 > 8
65101:  0002CD12FE2815CD > 1
65109:  9FFE1810CDFE12CD > 6
65117:  121320D3DDCB438E > 1
65125:  DDCB4396E1C9DDE5 > 1
65133:  E111280019CDA318 > 7

65141:  11180019CDA918DD > 6
65149:  CB4346201BDD7E43 > 8
65157:  DDB646E602C8DDE5 > 4
65165:  E1114700190E0ACD > 6
65173:  1E1320043EFFB7C9 > 4
65181:  37C901FB04ED43C9 > 6
65189:  5CCD6BFE38182816 > 1
65197:  DD7E44DDBE0D200E > 0
65205:  DDE5E11152001901 > 0
65213:  0002CD12FEC8CD12 > 6
65221:  1320DEE7113C7E66 > 0
65229:  167E7E6666787C66 > 4
65237:  6666667C783C7C60 > 5
65245:  7C7C607C3C3C7C60 > 5
65253:  7C7C6060603C3C18 > 3
65261:  1818183C3C7E7E0C > 6
65269:  0C6C6C7C3C606060 > 5
65277:  60607C7C7C667676 > 0
65285:  7E7E6E66663C7E66 > 3
65293:  6666667E3C3E7E40 > 5
65301:  7C3E027E7C160106 > 6
65309:  999093923D969890 > 0
65317:  91207F2095989720 > 7
65325:  9296969499000000 > 3
65333:  0000000000000000 > 0
65341:  0000000054414B45 > 6
65349:  2020202020202020 > 0
65357:  2020000000000000 > 6
```

John Ellis with a Microdrive toolkit for the Spectrum.



RANDOMIZE USR 40000

and the program will tell you which Rom you have. If you have a version 1 Rom you should use listings 3a, 4a and 5a, version 2 owners should use listings 3b, 4b and 5b. If you have an unknown Rom then you will be unable to use the programs.

The first programs, given in listing 3 enables you to save and erase files in the special protected format. The new commands are *Dump to save a file, and *Wipe to erase one. The USR call to invoke the two commands is

RANDOMIZE USR 64280

Before beginning to type in the bytes from listing 3a or 3b you must

CLEAR 64279

to move Ramtop out of the way. This also applies when you want to load the completed code for use in a program. When you have finished entering the bytes, the code should be saved:

SAVE *"M";1;"SAFE = SAVE" CODE 64280,1080 <ENTER>

The required syntax for the *Dump command is very similar to that of the Save command referred to the tape system. For example the expression

*DUMP "FILE 1"

would save the current Basic program onto drive 1 in the protected format. You may save to drives other than 1 by the inclusion of a valid drive number and a semicolon before the filename — the line

*DUMP 3;"FILE 1"

would have saved the program to drive 3. Note that all filenames for use with the protected save system may be a maximum of *nine* characters in length.

The forms

*DUMP "filename"LINE, *DUMP "filename" SCREEN $

and

*DUMP "filename" CODE

are supported, but *DUMP "filename" DATA is not. When saving code you can include an optional third parameter as an autorun address for the code block — eg.

*DUMP "GAME"CODE 30000,5000,31000

will save 5000 bytes of code starting at 30000. Immediately on loading the code will be executed from 31000. The other command provided by this listing, *Wipe, requires no parameters apart from the filename and an optional drive number — the only allowed syntax forms being *WIPE "filename" and

*WIPE 5; "filename"

Listings 4a and 4b contain the bytes for the other half of this utility — the program which allows you to reload protected files. Before beginning to type the bytes in you must

CLEAR 64444

and likewise on any subsequent loading. When you have finished, you should save the object code:

SAVE *"M";1;"SAFE = LOAD" CODE 64445,920 <ENTER>

This program provides only one new command, *Take, and the required address that must be called to insert it is 64445. The only

(continued on next page)

Listing 3B.

```
64280: CF312121FB22B75C > 7    64552: 485CED522236FF2A > 7    64824: CDF1FEDDE5E11143 > 2    65096: 08DD720CDD340DC9 > 8
64288: C9D71800FE2A2803 > 0    64560: 38FF110A00A7ED52 > 5    64832: 0019CDE215010E00 > 5    65104: E51E007BAE230B5F > 7
64296: C3F00124505C22C9 > 1    64568: 3802E70321E65C3A > 7    64840: CD50FE2037DDCB43 > 7    65112: 7B6120F77BBE77E1 > 6
64304: 5CD0213CFF0E022A > 8    64576: 2FFF77ED5B32FFCD > 3    64848: 462031DD7E43DDB6 > 7    65120: C9CDA510E5DD7E19 > 7
64312: C95C22505C060407 > 7    64584: EAFDED5B34FFCDEA > 0    64856: 46E6022005CDE313 > 6    65128: CD3215D1FF00ED43 > 8
64320: 20000DAE00280EEE > 6    64592: FDED5B30FFCDEAFD > 8    64864: 1822DDE5E1114700 > 2    65136: C95CCD40FE381A28 > 4
64328: 20280A551600D019 > 2    64600: ED5B36FFCDEAFDCD > 7    64872: 19010A00CD031420 > 4    65144: 15DDCB1866DDE5E1 > 6
64336: 0D20E418C3DD2310 > 3    64608: CDFE3AD65CCD3215 > 0    64880: 13CDEB1378B677DD > 8    65152: 11520019010002CD > 5
64344: E679FE0220062191 > 3    64616: D8EFE6012002E70E > 7    64888: CB434E2307DD7E44 > 7    65160: 50FE2812E711CDE3 > 5
64352: FBE5180421FCFCE5 > 4    64624: 2A34FF22E45CCD61 > 0    64896: 3CDD7700DDE5E111 > 0    65168: 13CDF71320DCCDC8 > 2
64360: D72000DD212FFFDD > 6    64632: FEDDCB18462005CD > 0    64904: 5200191E000E207E > 0    65176: 43BEDDCB4396E1C9 > 7
64368: 3600D0D7FB24FDCB > 3    64640: 0E13E70CDDCB4306 > 7    64912: 2308081F30011C10 > 4    65184: CDF1FE11180019CD > 2
64376: 01762814DDCB00C6 > 6    64648: DD7E19CD3215DDE5 > 2    64920: FA0D20F3DD7E00BB > 1    65192: EB15DDCB4346201B > 4
64384: FE3B20A1D72000D7 > 6    64656: E111520019EB21E6 > 7    64928: 2091CD491ECDF1FE > 3    65200: DD7E43DDB646E602 > 5
64392: FB24FDCB01762098 > 6    64664: 5C0109000D710BED > 7    64936: CDEB132823E5C53E > 3    65208: C8DDE5E111470019 > 6
64400: C9FECA2020FEAF28 > 1    64672: B0D5210900ED4B32 > 6    64944: E6D3EF016801CD52 > 5    65216: 0E0ACD031420043E > 1
64408: 19FEAA2027DDCB00 > 0    64680: FF09CB3C24E5CD43 > 3    64952: 16DDE5E111370019 > 3    65224: FFB7C937C9060A21 > 2
64416: DE21001B2232FF21 > 4    64688: 1DE17B8C3002E70F > 7    64960: CD83153EEED3EFCD > 0    65232: 44FFE5220C8C3620 > 6
64424: 00402234FFD72000 > 5    64696: D12AE45CED4B32FF > 6    64968: E313C1E1782FA677 > 1    65240: 2310FBE1360023ED > 0
64432: 181200CB00CED779 > 6    64704: 7BB12822DD7E0CFE > 0    64976: DDE5E11152001906 > 6    65248: 5B3AFFEBED4B38FF > 3
64440: 1CFE2C20070DCB00 > 5    64712: 02200FE5C5CDF3FD > 1    64984: 207EB720C82310F9 > 0    65256: ED80210400220A5C > 8
64448: D6D7811CCD870500 > 2    64720: C1DDE5E111520019 > 2    64992: AFCD3215CD9F11C3 > 0    65264: C9DDE5E111280019 > 1
64456: CB00562807D7991E > 8    64728: EBE1EDA0DD340B20 > 6    65000: C10523CB0BCB0272 > 4    65272: CDE215CD26142008 > 7
64464: ED4330FFDDCB004E > 0    64736: DFDD340C20DADDCB > 0    65008: 2373C9CD49132009 > 7    65280: 010E00CD50FE20E9 > 1
64472: 2814DDCB005E200E > 7    64744: 43CECDF3FDAFCD32 > 8    65016: CD9F11AFCD3215E7 > 6    65288: DDCB2346283E3C90 > 1
64480: D7991EED4332FFD7 > 2    64752: 15CD9F11CD921527 > 1    65024: 0FDDE5060ADD7E0E > 4    65296: F128ED4338FFED53 > 3
64488: 991EED4334FFCD0F > 1    64760: D9C3C105CDB705CD > 0    65032: DD7747DD2310F6DD > 1    65304: 3AFFDDCBD0462808 > 3
64496: FFDDCB004E200EED > 6    64768: 0FFFCDCDFECDA510 > 1    65040: E1DD4E08DD7145DD > 2    65312: D7941E32D85CFE09 > 5
64504: 5B32FF2A34FF1930 > 8    64776: DD7E19CD3215DDEF > 5    65048: 7E0CDD7746DD7E0C > 0    65320: C8E7043E0118F400 > 7
64512: 2ECDA313052A30FF > 2    64784: E6012002E70EDDE5 > 4    65056: DD7744DDE5E11143 > 2    65328: 0000000000000000 > 5
64520: DDCB005E20211110 > 6    64792: E111520019E5D113 > 1    65064: 0019010E00CD50FE > 7    65336: 0000000044554050 > 0
64528: 27A7ED5230EB2A53 > 6    64800: 011F003600ED803E > 0    65072: 110F0019010002CD > 6    65344: 5749504520202020 > 4
64536: 5C2234FFED5B595C > 7    64808: FFDD770D01FB04ED > 5    65080: 50FEDDE5E1114700 > 3    65352: 2020202020200000 > 6
64544: 37EBED522232FF2A > 6    64816: 43C95CCDF713286A > 1    65088: CD5A13110000DD73 > 7
```

Listing 4B.

```
64445: CF3121C6FB22B75C > 1    64669: CEFDCB7CE6CD23FE > 3    64901: 080019CB3C247C32 > 6    65133: E111280019CDE215 > 1
64453: C9D71800FE2A2803 > 0    64677: DDCB18462802E711 > 1    64909: E75CCD041A110900 > 0    65141: 11180019CDEB15DD > 3
64461: C3F0010504DD2141 > 0    64685: DDE5E11152001911 > 1    64917: DD6E45DD6646DDE5 > 0    65149: CB434620 1BDD7E43 > 8
64469: FFD72000DDAE0028 > 1    64693: E65C010900EDB0ED > 8    64925: E1115B0019ED5BE9 > 8    65157: DDB646E602C8DDE5 > 4
64477: 04EE2020EBDD23D7 > 4    64701: 5BE75C2133FFCD09 > 5    64933: 5C181ACDE1FDDD7E > 8    65165: E1114700190E0ACD > 6
64485: 200010F0DD2132FF > 8    64709: FEED5BE95CCD09FE > 3    64941: 44B728F7173D571E > 1    65173: 031420043EFFB7C9 > 6
64493: DD360000D7FB24FD > 2    64717: ED5BEB5CCD09FEED > 8    64949: F72AE95C19EBDDE5 > 3    65181: 37C901FB04ED43C9 > 6
64501: CB01762814DDCB00 > 2    64725: 5BED5CCD09FE3AE6 > 4    64957: E10152000 9D9CDBF > 4    65189: 5CCD6BFE38182816 > 1
64509: C6FE3B20CBD72000 > 3    64733: 5C3232FFCB4F205E > 2    64965: 1320E07EB077D9DD > 2    65197: DD7E44DDBE0D200E > 0
64517: D7FB24FDCB017620 > 7    64741: CB5F205AED5B535C > 0    64973: 4E45DD4646EDB03A > 1    65205: DDE5E11152001901 > 8
64525: BFCDB70ED7F12BED > 2    64749: 2A595C37ED52ED5B > 1    64981: E75C3D32E75C20CB > 6    65213: 0002CD12FEC8CDF7 > 2
64533: 433BFFED533DFFDD > 4    64757: 33FFEB37ED523809 > 0    64989: CD1E1AC901FB04ED > 1    65221: 1320DEE7113C7E66 > 0
64541: CB0046280BD7941E > 2    64765: 110500194440D705 > 8    64997: 43C95CCD6BFE3815 > 8    65229: 667E7E66667B7C66 > 4
64549: 323FFF18043E0118 > 8    64773: 1FED5B535C2A595C > 4    65005: 2813CDBF13200EDD > 1    65237: 6666667C783C7C60 > 5
64557: F73A3FFF32D65CFE > 4    64781: 2BD7E519ED4B33FF > 0    65013: E5E1115200190100 > 0    65245: 7C7C607C3C3C7C60 > 5
64565: 093802E704DDCB00 > 2    64789: 2A535CD7551623ED > 1    65024: 02CD12FEC8CDF713 > 4    65253: 7C7C6060603C3C18 > 3
64573: 4E2A3DFFED4B3BFF > 8    64797: 4B39FF092245C3A  > 0    65029: 20E1E711CB0BCB02 > 8    65261: 1818183C3C7E7E0C > 6
64581: 79D60938060E09ED > 2    64805: 32FFCB57280A2A37 > 0    65037: 722373230C9E51E00 > 0    65269: 0C6C6C7C38606060 > 5
64589: 433BFF1146FFAF1B > 1    64813: FF22425CFD360A00 > 1    65045: 7BAE23065F788120 > 7    65277: 60607C7C7C667676 > 0
64597: 1213ED602145FF22 > 3    64821: 2A535CED5B33FF2B > 2    65053: F77BBE77E1C9CDA5 > 1    65285: 7E7E6E66663C7E66 > 3
64605: DC5C2A3BFF2322DA > 3    64829: 22575C2318072A35 > 1    65061: 10E5DD7E19CD3215 > 4    65293: 6666667E3C3E7E40 > 5
64613: 5C2A7B5CE521CAFE > 5    64837: FFED5B33FFCD7AFD > 1    65069: 01FF00ED43C95CCD > 1    65301: 7C3E027E7C180106 > 8
64621: 227B5C3A485CE638 > 5    64845: CD8E13ED7B3D5CFD > 4    65077: 6BFE3823281EDDCB > 1    65309: 999093923D969890 > 0
64629: FE183804F6021802 > 4    64853: 3600FF21F41BDF28 > 2    65085: 1886DD7E44B7200F > 1    65317: 91207F2095989720 > 7
64637: F644FD7755FDCB02 > 2    64861: 03217D1BCD0007FD > 5    65093: DDE5E11152001901 > 5    65325: 9296969499000000 > 3
64645: C6011800111AFFD7 > 4    64869: 367C003A32FFCB4F > 2    65101: 0002CD12FE2815CD > 1    65333: 0000000000000000 > 0
64653: 3C20D74D0DE1227B > 6    64877: 2002E5C9CB5728FA > 7    65109: 9FFE1810CDE313CD > 4    65341: 0000000054414B45 > 6
64661: 5CFDCB0286FDCB7C > 2    64885: 2A37FF18F57AB3C8 > 0    65117: F71320D3DDCB438E > 5    65349: 2020202020202020 > 0
                               64893: 22E95CED5B33FF21 > 7    65125: DDCB4396E1C9DDE5 > 1    65357: 2020000000000000 > 6
```

(continued from previous page)

permissible syntax is

*TAKE "filename"

or

*TAKE 4; "filename"

If the Break key is pressed whilst the program is loading a file then the machine will be reset.

I suggest that you experiment with the safe loading system on a blank cartridge until you are sure that it is working properly. Note that when a Basic program is *Taken from cartridge, all its variables are loaded as well.

The final major program is the syntax simplifier. The bytes are given in listing 5. Before typing in or loading the object code you must

CLEAR 64879

When you have finished entering, the code should be saved:

SAVE *"SHORT SYN" CODE 64880,480 <ENTER>

This program provides six new commands which are inserted with the line

RANDOMIZE USR 64880

The six commands are *Save, *Load, *Verify, *Merge, *Erase and *Format. These commands perform exactly the same functions — with one exception — as their normal counterparts. However, the clumsy "M";1; syntax has been abandoned. All six commands have the drive number as an optional parameter as in *Dump etc.

All the commands except *Save take exactly the same syntax form as *Take and *Wipe. Note that, contrary to the normal requirement you do not need to state in a Load-type command the kind of file you want to load, the program automatically determines the nature of the incoming file, and treats it accordingly. All the usual options for saving screens, arrays and code are available with the *Save command.

The *Erase comand has an extra function — a wild card facility in the filename.

As an example — if you had three files on a cartridge called Block 1, Block 2 and Block 3 you could erase all three in a single *Erase line:

*ERASE "BLOCK ?"

The '?' character in the filename indicates that that particular character position need not be checked for a match when searching the cartridge for records of the file to be erased. Note that the line

*ERASE "?????????"

will erase all files on the cartridge.

Listing 6 is a sub-routine which enables you to have your new commands give their own unique error messages. Each error message should be added to the table with 80hex added to the last character.

The messages are printed with a black square instead of an error letter or number to indicate that they are non-standard errors. The routine is activated from your program by loading the location Error with the number of the message in the table minus one, and then calling NewRR. The new Rom *must* be paged in when this routine is called otherwise a crash will occur — line 90.

Listing 7 is a command interpreter for building a library of new Basic statements. It scans the table CMTAB for a command, giving a syntax error if it is not found, and jumping to the appropriate address if it is.

Tapes containing the Safe=Load system and the syntax shortener can be obtained from the author price £2.50 inc p&p. Quote v1.1 for a version 1 Rom and v1.2 for a version 2 Rom. Write to Jon Ellis at 29 Ashridge Drive, Bricket Wood, St. Albans, Hertfordshire, AL2 3SR enclosing a cheque or postal order. ■

Listing 5A.

```
64880: CF312179FD22B75C > 0
64888: C9D71800FE2A2038 > 8
64896: 0606210BFFC5ED5B > 1
64904: 5D5CE5D72000E1BE > 3
64912: 2805EE20BE201423 > 6
64920: 7EFE3D20ED235E23 > 2
64928: 56D72000EBC1FD36 > 0
64936: 4700E9ED535D5C06 > 8
64944: FF3E5EEDB1C110CD > 4
64952: C3F001FDCB7CE618 > 4
64960: 1CFDCB7CEE1816FD > 3
64968: CB7CF61810FDCB7C > 4
64976: FE180AFDCB47CE18 > 0
64984: 04FDCB47D63E4D32 > 4
64992: D95CDD2A5D5CD7FB > 2
65000: 24FDCB0176280DFD > 5
65008: CB47C6FE3B20C1D7 > 5
65016: 20001804DD225D5C > 8
65024: DF2812FDCB474628 > 2
65032: 05D7991E18030101 > 6
65040: 00ED43D65CCD3206 > 1
65048: FDCB7C6E2806CD16 > 6
65056: 07C33608CDB705FD > 3
65064: CB474EC2E704FDCB > 7
65072: 4756201421E65C11 > 8
65080: DE5C010700EDB0CD > 6
65088: 8506CD8015C3AF08 > 2
65096: 2141FFE5D1010A00 > 4
65104: 362013EDB02ADC5C > 4
65112: ED4BDA5C1141FFED > 3
65120: B0CDE590DD7E19CD > 5
65128: F717DBEFE6012002 > 8
65136: E70EDDE5E1115200 > 3
65144: 19E5D113011F00AF > 5
65152: 77EDB03EFFDD770D > 2
65160: FDCB479E01FF00ED > 3
65168: 43C95CCD12132866 > 3
65176: CDC412CD531E2040 > 5
65184: DD7E43DDB646E602 > 5
65192: 2005CDFE121831DD > 4
65200: E5E1114700190 60A > 6
65208: 1141FF1AFE3F2002 > 6
65216: 1803BE201B231310 > 2
65224: F2FDCB47DECD0613 > 8
65232: 78B677DDCB434E28 > 8
65240: 07DD7E443CDD770D > 6
65248: DDE5E1115200191E > 6
65256: 000E207E2306081F > 0
65264: 30011C10FA0D20F3 > 4
65272: DD7E0DBB2095CDF8 > 0
65280: 1DFDCB475EC261FE > 4
65288: C3C105534156453D > 4
65296: C1FD5E4C4F41443D > 1
65304: BBFD5E5645524946 > 5
65312: 593DCDFD5E4D4552 > 3
65320: 47453DC7FD5E464F > 8
65328: 524D41543DD3FD5E > 1
65336: 45524153453DD9FD > 1
65344: 5E31323334353637 > 7
65352: 3839300000000000 > 8
```

Listing 5B.

```
64880: CF312179FD22B75C >0
64888: C9D71800FE2A2038 >8
64896: 0606210BFFC5ED5B >1
64904: 5D5CE5D72000E1BE >3
64912: 2805EE20BE201423 >6
64920: 7EFE3D20ED235E23 >2
64928: 56D72000EBC1FD36 >0
64936: 4700E9ED535D5C06 >8
64944: FF3E5EEDB1C110CD >4
64952: C3F001FDCB7CE618 >4
64960: 1CFDCB7CEE1816FD >3
64968: CB7CF61810FDCB7C >4
64976: FE180AFDCB47CE18 >0
64984: 04FDCB47D63E4D32 >4
64992: D95CDD2A5D5CD7FB >2
65000: 24FDCB0176280DFD >5
65008: CB47C6FE3B20C1D7 >5
65016: 20001804DD225D5C >8
65024: DF2812FDCB474628 >2
65032: 05D7991E18030101 >6
65040: 00ED43D65CCD3206 >1
65048: FDCB7C6E2806CD16 >6
65056: 07C33608CDB705FD >3
65064: CB474EC2E704FDCB >7
65072: 4756201421E65C11 >8
65080: DE5C010700EDB0CD >6
65088: 8506CD7119C3B308 >8
65096: 2141FFE5D1010A00 >4
65104: 362013EDB02ADC5C >4
65112: ED4BDA5C1141FFED >3
65120: B0CDA510DD7E19CD >6
65128: 3215DBEFE6012002 >5
65136: E70EDDE5E1115200 >3
65144: 19E5D113011F00AF >5
65152: 77EDB03EFFDD770D >2
65160: FDCB479E01FF00ED >3
65168: 43C95CCDF7132866 >5
65176: CDA913CD5E1E2040 >7
65184: DD7E43DDB646E602 >5
65192: 2005CDE3131831DD >0
65200: E5E1114700190 60A >6
65208: 1141FF1AFE3F2002 >6
65216: 1803[illegible]E201B231310 >2
65224: F2FDCB47DECDEB13 >0
65232: 78B677DDCB434E28 >3
65240: 07DD7E443CDD770D >8
65248: DDE5E1115200191E >6
65256: 000E207E2306081F >0
65264: 30011C10FA0D20F3 >4
65272: DD7E0DBB2095CD03 >2
65280: 1EFDCB475EC261FE >5
65288: C3C105534156453D >4
65296: C1FD5E4C4F41443D >1
65304: BBFD5E5645524946 >5
65312: 593DCDFD5E4D4552 >3
65320: 47453DC7FD5E464F >8
65328: 524D41543DD3FD5E >1
65336: 45524153453DD9FD >1
65344: 5E31323334353637 >7
65352: 3839300000000000 >8
```

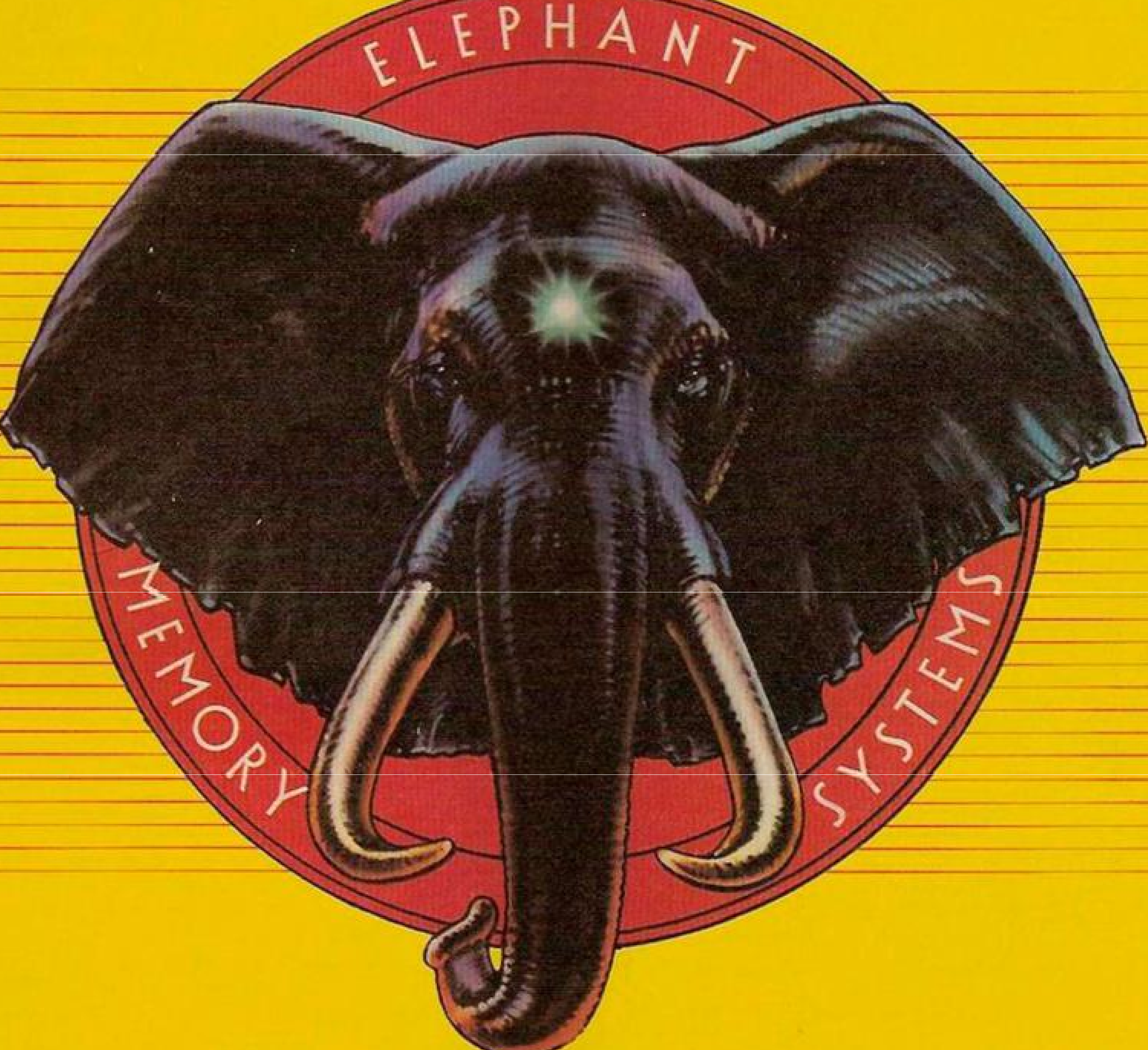
Listing 6.

```
00010 ;*************************
00020 ;** NEW ERROR SYSTEM    **
00030 ;** by Jon Ellis 1985  **
00040 ;*************************
00050 ORG address
00060 NEWRR LD SP,(23613)
00070       LD HL,HANDL
00080       EX (SP),HL
00090       RST 0
00100 HANDL LD HL,(23755)
00110       LD (23645),HL
00120       RES 5,(IY+1)
00130       LD HL,0
00140       LD (IY+55),H
00150       LD (23563),HL
00160       INC HL
00170       LD (23574),HL
00180       CALL 5808
00190       CALL 3438
00200       SET 5,(IY+2)
00210       LD A,143
00220       RST 16
00230       LD A,32
00240       RST 16
00250       LD A,(ERROR)
00260       LD DE,ERTAB
00270       JP 4934
00280 ;
00290 ;*************************
00300 ;**   ERROR MESSAGES    **
00310 ;*************************
00320 ERROR DEFB 0
00330 ERTAB DEFB 128
00340       DEFM /Example /
00350       DEFM /messag/
00360       DEFB "e+128
P0
```

Listing 7.

```
;*************************
;** COMMAND SEARCHER    **
;** by Jon Ellis 1985  **
;*************************
ORG address
VECTR RST 8
      DEFB 49
      LD HL,NUCOM
      LD (23735),HL
      RET
NUCOM RST 16
      DEFW 24
      CP "*
      JR NZ,NFIND
LOOK  LD B,number
      LD HL,CMTAB
LOOP1 PUSH BC
      LD DE,(23645)
NXLET PUSH HL
      RST 16
      DEFW 32
      POP HL
      XOR (HL)
      JR Z,LETOK
      XOR 32
      JR NZ,WRONG
LETOK INC HL
      LD A,(HL)
      CP "=
      JR NZ,NXLET
      INC HL
      LD E,(HL)
      INC HL
      LD D,(HL)
      RST 16
      DEF 32
      EX DE,HL
      POP BC
      JP (HL)
WRONG LD (23645),DE
      LD B,255
      LD A,"*
      CPIR
      POP BC
      DJNZ LOOP1
NFIND JP 496
;
;*************************
;**   COMMAND TABLE     **
;*************************
CMTAB DEFM /EXAMPLE=/
      DEFW EGRUN
      DEFB "*
P0
```

MORE ELEPHANTS TO TRUST





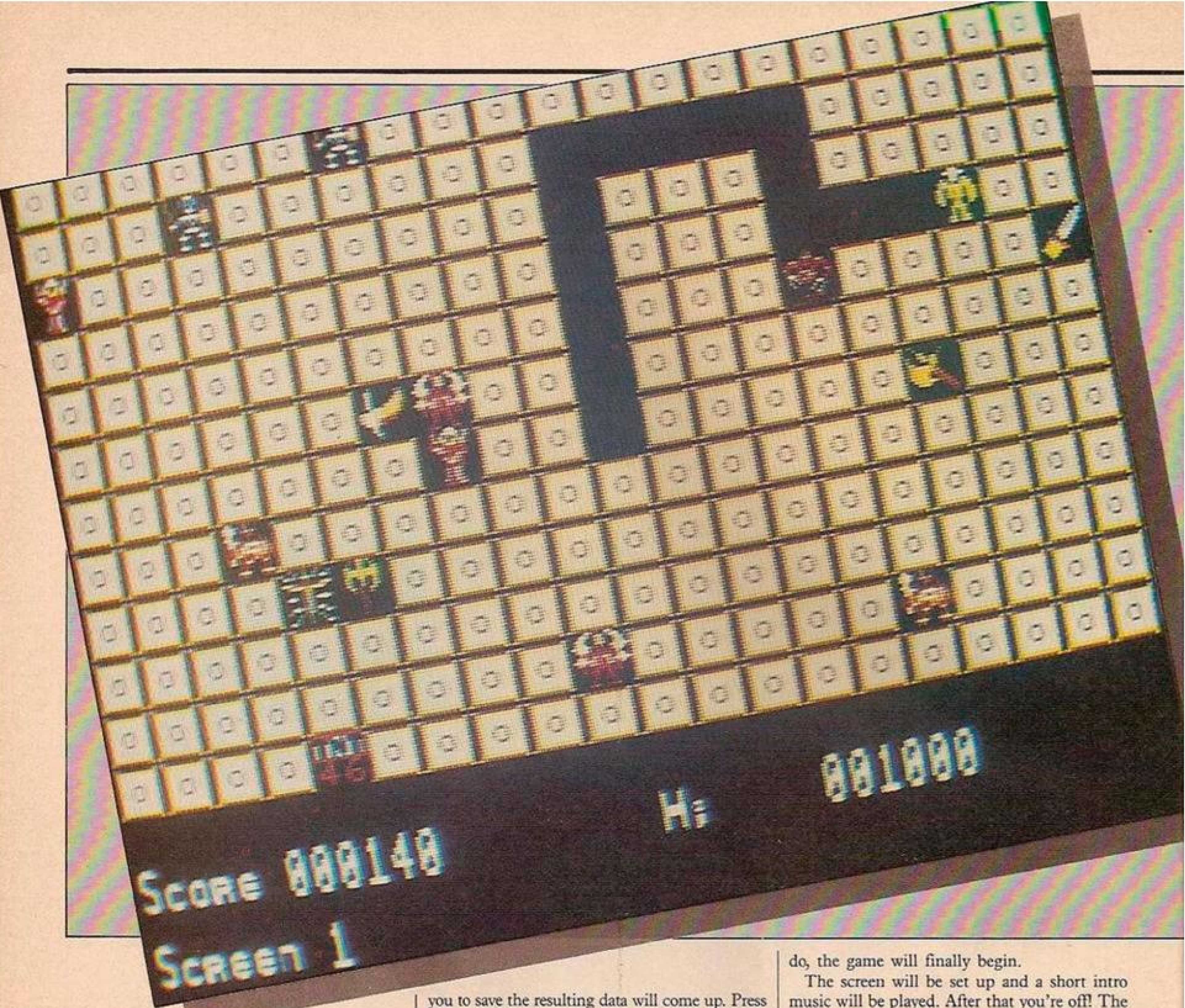
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ONE DAY, HERMANN is out in the woods collecting acorns when he suddenly realises he has accidentally wandered into the courtyard of the evil Dr. Sinclive's castle. Soon he is surrounded by hideous creations. To make matters worse, a bomb is slowly ticking away. His only hope is to collect the weapons and defuse the bomb . . .

Type in listing 1 carefully and save it to tape. Now type in listing 2 and save it on another tape. Run listing 2 and if all goes well, a prompt for you to save the resulting data will come up. Press Y so that the data will be saved after listing 1 — it will be saved under filename "DATA". Now type in listing 3 and save it under "M.CODE" after "DATA" and type in listing 4 and save it under "ESCAPE" after listing 3.

Now you're in a position to run the game. Chain in the first program. It should proceed to load in the data and the main programs. When all the parts have been loaded, the cast of the game should be printed and the program will wait for you to press the space bar. When you do, the game will finally begin.

The screen will be set up and a short intro music will be played. After that you're off! The point of the game is to collect the five weapons which are littered about the screen and defuse the bomb by sitting on it! Note that all the weapons must be collected before the bomb is defused. By collecting the weapons in a certain order, big bonus points will be gained. I will leave it to you to investigate the order in which to collect the weapons.

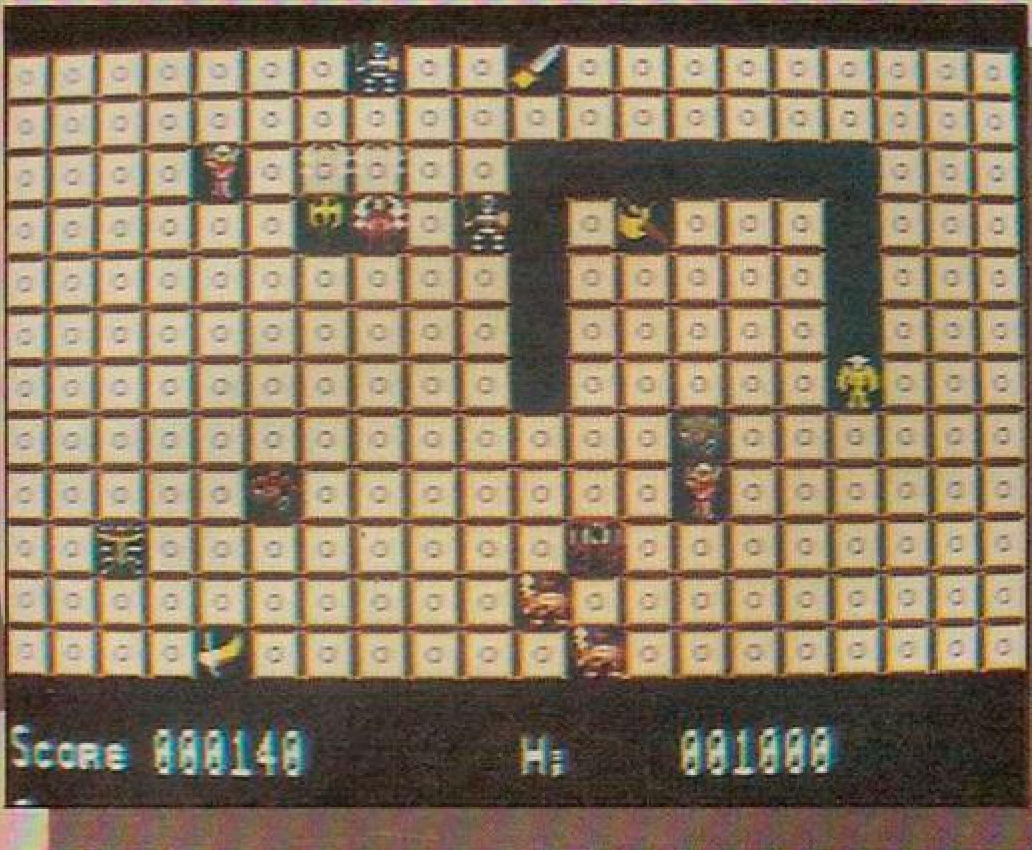
Control Hermann with Z, X, * and ? to move left, right, up and down respectively. Every time

(continued on page 70)

Listing 2.

```
10REM Data for Hermann's great escape
20REM By Shingo Sugiura
30REM (C) July 1985
40
50MODE7:HIMEM=&2A30
60def=&2C50
70PROCgfx
80PROCdata
90PROChall
100PRINT"Save data?";:A$=GET$:PRINTA$
110IF A$="Y" THEN *SAVE"DATA"2A30 3000
120END
130DEFPROCgfx
140T%=def
150FORA%=0TO12
160FORR%=1TO16
170READ A$:!T%=EVAL("&"+A$):T%=T%+4
180NEXT,
190ENDPROC
200REM Monster 1
210DATA 40404040,06202020,11222211,AA770011
220DATA 44AAAACC,ABEF89CD,0C000000,C2C2C20E
230DATA 00002237,00000000,44330011,EE4444EE
240DATA 11EE8945,33111133,000C0EC2,88000088
250REM Monster 2
260DATA 33777733,07333377,028B8A02,B51F8F06
270DATA 0E878181,1FFF0F04,08000000,4B4A0E0C
280DATA 33330707,00000000,1607C3B5,0FF00F07
290DATA 802D2DFF,01100108,C00E874B,0FE10E0E
300REM Monster3
310DATA 12000000,37064007,0D120301,0725060D
320DATA 1A0C0C08,840C060B,08000000,0642060C
330DATA 00112222,03000000,020145A9,05090702
340DATA 99443B0C,05040726,0088000C,06200000
350REM Monster 4
360DATA 03111101,00011103,BC2E3B19,074F8F1E
370DATA 61A3E6CC,2F0F0FC3,884C4C0C,08080888
380DATA 00000000,00000000,23031327,07472323
390DATA 4E0F8F4F,2F4F4E4E,00000000,00000000
400REM Monster 5
410DATA 77773300,672377FF,12129ACD,2F0F0D8B
420DATA 8484953B,4F0F0B1D,EEEECC00,6E4CEEFF
430DATA 030347FF,01000202,06074F4F,0E0C0606
440DATA 060E2F2F,07030606,0C0C2EFF,08000404
450DATA 10100000,10101010,F0909050,818191F0
460DATA F09090A0,989898F0,80800000,80808080
470DATA 00000000,00000000,010141C1,01010101
480DATA 08082838,08080808,00000000,00000000
490REM Weapon 1
500DATA 10204000,F0C08090,80000000,E116D2D0
510DATA 40200000,08808080,00000000,00000000
520DATA 70F0F0F0,00000030,F0C0C1E1,000000C0
530DATA 070F0E0C,00000103,08000000,040E0E0C
540REM Weapon 2
550DATA 00668811,000030E1,03B89810,2121E10F
560DATA 08A22211,8080F00F,00CC2200,000080E0
570DATA 33000077,66110044,A9212121,10109821
580DATA B38000B3,00112280,000000CC,CC0000CC
590REM Weapon 3
600DATA 00000000,03010000,00000000,3B110000
610DATA 33110000,EEBFDF67,4CAE6611,000088CC
620DATA 70301001,103070F0,C3871F3F,0080C0E1
630DATA 000088CC,0000080C,00000000,00000000
640REM Weapon 4
650DATA 33331100,11333333,00000000,F8100000
660DATA 10100000,F0F07030,840C0808,080C8484
670DATA 77FFFFFF,00001111,8F8FF8F8,44CC8888
680DATA 000E0FE1,00000000,00000008,00000000
690REM Weapon 5
700REM Hermann
710DATA 00000000,30301010,D1117711,B0B0F0E0
720DATA DCCCFFCC,68E0F8B8,80000000,E0E0C0C0
730DATA 00103030,00000000,309090B0,70703030
740DATA E0C048E0,70706060,00C0E0E0,00000000
750REM TNT
760DATA 4C00000F,0F4C4C4C,CC44550F,0FDDDDCC
770DATA 33AAAA0F,0FBB3333,2301010F,0F232323
780DATA 00000000,00000000,00000000,00000000
790DATA 00000000,00000000,00000000,00000000
800REM Tile
```

HERMANN AND THE GREAT ESCAPE



Listing 1.

```
10MODE7:*TV0.1
20PROCdefine
30*L.DATA
40CHAIN"M.CODE"
50END
60:
70DEFPROCdefine
80VDU23,224,&3C,&7E,&62,&60,&60,&70,&3C,&E
90VDU23,225,&6,&6,&46,&7E,&3C,&0,&0,&0
100VDU23,226,&0,&0,&0,&0,&0,&3C,&7E,&62
110VDU23,227,&60,&60,&62,&7E,&3C,&0,&0,&0
120VDU23,228,&0,&0,&0,&0,&0,&3C,&7E,&66
130VDU23,229,&66,&66,&66,&7E,&3C,&0,&0,&0
140VDU23,230,&0,&0,&0,&0,&0,&FC,&FE,&C6
150VDU23,231,&FE,&FC,&E6,&E6,&E6,&0,&0,&0
160VDU23,232,&0,&0,&0,&0,&0,&3C,&7E,&60
170VDU23,233,&7E,&7E,&60,&7E,&3C,&0,&0,&0
180VDU23,234,&0,&41,&63,&63,&63,&63,&7F,&7F
190VDU23,235,&7F,&63,&63,&63,&63,&41,&0,&0
200VDU23,236,&0,&0,&0,&0,&0,&38,&28
210VDU23,237,&38,&0,&38,&38,&38,&30,&0,&0
220VDU23,238,&0,&0,&0,&0,&0,&7C,&7E,&46
230VDU23,239,&46,&46,&46,&46,&46,&0,&0,&0
240VDU23,240,&FC,&FE,&C7,&C3,&C3,&C3,&C6,&FC
250VDU23,241,&FC,&C6,&C3,&C3,&C3,&C3,&FE,&FC
260VDU23,242,&7E,&FF,&E3,&C1,&C1,&C1,&C1,&C1
270VDU23,243,&C1,&C1,&C1,&C1,&C1,&E3,&FF,&7E
280VDU23,244,&FC,&FE,&E3,&C3,&C3,&C3,&C3,&C3
290VDU23,245,&C3,&C3,&C3,&C3,&C3,&C3,&C3,&C3
300VDU23,246,&E3,&E3,&E3,&E3,&E3,&E3,&E3,&E3
310VDU23,247,&E3,&E3,&E3,&E3,&E3,&E3,&FF,&7E
320VDU23,248,&7E,&FF,&E3,&C1,&C0,&C0,&E0,&7E
330VDU23,249,&7E,&7,&3,&3,&83,&C7,&FF,&7E
340VDU23,250,&00,&18,&3C,&7E,&18,&18,&18,&00
350VDU23,251,&00,&10,&30,&7E,&7E,&30,&10,&00
360VDU23,252,&00,&18,&18,&18,&7E,&3C,&18,&00
370VDU23,253,&00,&08,&0C,&7E,&7E,&0C,&08,&00
380ENVELOPE1,1,0,0,0,0,0,0,125,-1,0,-3,125,0
390ENVELOPE2,0,4,4,4,10,10,10,127,0,0,-127,126,0
400ENVELOPE3,1,1,0,0,10,0,0,127,-1,-1,-1,150,25
410ENDPROC
```



This article is available on the Telsoft service.

Collect the weapons, defuse the bomb, avoid Dr. Sinclive's hideous creations and escape his castle. Shingo Sugiura shows you how to help Hermann collect the weapons littered about the screen using a BBC micro.




```
810DATA 7B788F00,7B7B7B7B,FFF00F00,BFCFFFFF
820DATA FFF00F00,BF7FFFFF,CAC22E00,CACACACA
830DATA 7B7B7B7B,8F7B7B7B,FFCFBFBF,0FF0FFFF
840DATA FF7FBFBF,0FF0FFFF,CACACACA,2EC2CACA
850DEFPROChall
860P%=&2B53
870[OPT0
880OPT FNtab(6,2)
890OPT FNequb(134):OPT FNequb(141)
900OPT FNequs("Congratulations!!")
910OPT FNtab(6,3)
920OPT FNequb(134):OPT FNequb(141)
930OPT FNequs("Congratulations!!")
940OPT FNtab(6,8):OPT FNequb(129)
950OPT FNequs("Your great score")
960OPT FNtab(0,10):OPT FNequb(129)
970OPT FNequs("qualifies for the Hall of Fame.")
980OPT FNtab(4,13):OPT FNequb(131)
990OPT FNequs("Please enter your name.")
1000OPT FNtab(3,15)
1010OPT FNequb(134):OPT FNequb(157):OPT FNequb(129):O
PT FNtab(29,15)
1020OPT FNequb(156)
1030OPT FNtab(7,15)
1040OPT FNequb(255)
1050]
1060FORA%=0TO7:READA$:$(&2A30+A%*20)=A$:NEXT
1070ENDPROC
1080DEFPROCdata
1090FORE%=0TO111
1100READA%:E%?&2F90=A%
1110NEXT
1120FORA%=0TO101STEP3
1130READB%,C%,D%:A%?&2BE0=B%:A%?&2BE1=C%:A%?&2BE2=D%
1140NEXT
1150FORA%=0TO46:READB%,C%:A%?&2AF0=B%:A%?&2B1F=C%:NEX
T
1160ENDPROC
1170DEFFNequb(N%)
1180?P%=N%:P%=P%+1
1190=0
1200DEFFNequs(A$)
1210$P%=A$:P%=P%+LENA$
1220=0
1230DEFFNtab(X%,Y%)
1240?P%=31:P%=P%+1
1250?P%=X%:P%=P%+1
1260?P%=Y%:P%=P%+1
1270=0
1280DATA17,3,31,0,26,128,130,132,134,136,10,13,129,13
1,133,135,137
1290DATA31,20,26,138,140,10,8,8,139,141
1300DATA10,10,13,224,226,230,232,232,238
1310DATA10,13,225,227,231,233,233,239
1320REM data for intro music
1330DATA 165,3,169,3,169,3,169,3,117,3,121,3,121,3,12
1,3
1340DATA 69,3,73,3,73,3,73,7
1350DATA 157,3,161,3,165,3,169,6,157,6,169,3,157,6
1360DATA 169,3,177,3,157,3,157,3,157,5
1370DATA 149,3,141,6,149,6,129,6,149,3,129,6
1380DATA 149,7,153,3,153,3,153,3
1390REM Data for end of game music
1400DATA1,101,8,2,69,16,3,53,16,1,117,4
1410DATA2,81,16,3,49,16,1,101,4,2,69,16
1420DATA3,45,16,1,109,8,2,73,16,3,41,16
1430DATA1,117,4,2,69,16,3,33,16,1,121,4
1440DATA2,61,16,3,25,16,1,129,8,1,121,4
1450DATA1,117,4,2,53,16,3,21,16,1,89,8
1460DATA1,109,4,1,121,4,1,117,8,1,109,4
1470DATA1,101,4,1,97,4,1,101,4,1,109,4
1480DATA1,97,4,1,101,32
1490REM Data for Music
1500DATA 125,3,129,3,129,3,129,3,125,3,129,3,129,3,12
9,3
1510DATA 125,3,129,3,129,3,129,3,125,3,129,3,129,3,12
9,3
1520DATA 117,6,109,3,117,6,109,3,117,3,109,3,117,13,1
09,13
1530DATA 113,3,117,3,117,3,117,3,113,3,117,3,117,3,11
7,3
1540DATA 113,3,117,3,117,3,117,3,113,3,117,3,117,3,11
7,3
1550DATA 117,6,109,3,117,6,109,3,117,3,109,3,129,25
1560DATA SHINGOSOFT,HERMANN THE GREAT,EVIL DR SINCLIV
E,MADONNA
1570DATA RONNY REAGAN,BORN IN THE U.S.A.,MAX THROTTLE
,MR USELESS
```

(continued from page 68)

movement. So you must not move around the screen wildly disposing of all the blocks because you will soon find that you are totally stuck!

However, seemingly impossible situations may be got out of by using the scroll feature. By pressing A and J, the row Hermann is in will move left or right. Of course, the bomb must be defused before it goes off — indicated by the time on the bottom half of the bomb — and there are 10 monsters roving about the screen intent on capturing Hermann! As you progress, pot holes will appear further restricting your movement.

Screens may be cleared quite easily if you ignore the bonus feature but in order to obtain any decent score, you must go for the bonus points.

The game ends if Hermann is eaten by a monster, you run out of time or you try to defuse the bomb before you have collected all the weapons. If you have achieved a good score, you will be asked to enter your name in the hall of fame for posterity.

During the game, sound output may be disabled by pressing Q and enabled by pressing S. Remember, that if you disable the sound, nothing will happen while the micro is playing the intro music. So there will be a slight delay before the game starts. Don't press Break thinking the machine has crashed!

It is because of the Beeb's ridiculously small memory capacity that I split up the program into so many small sections.

However, the graphics and sound effects are rather special for a magazine listing and the game itself is very good fun. So please have a go at typing it in.

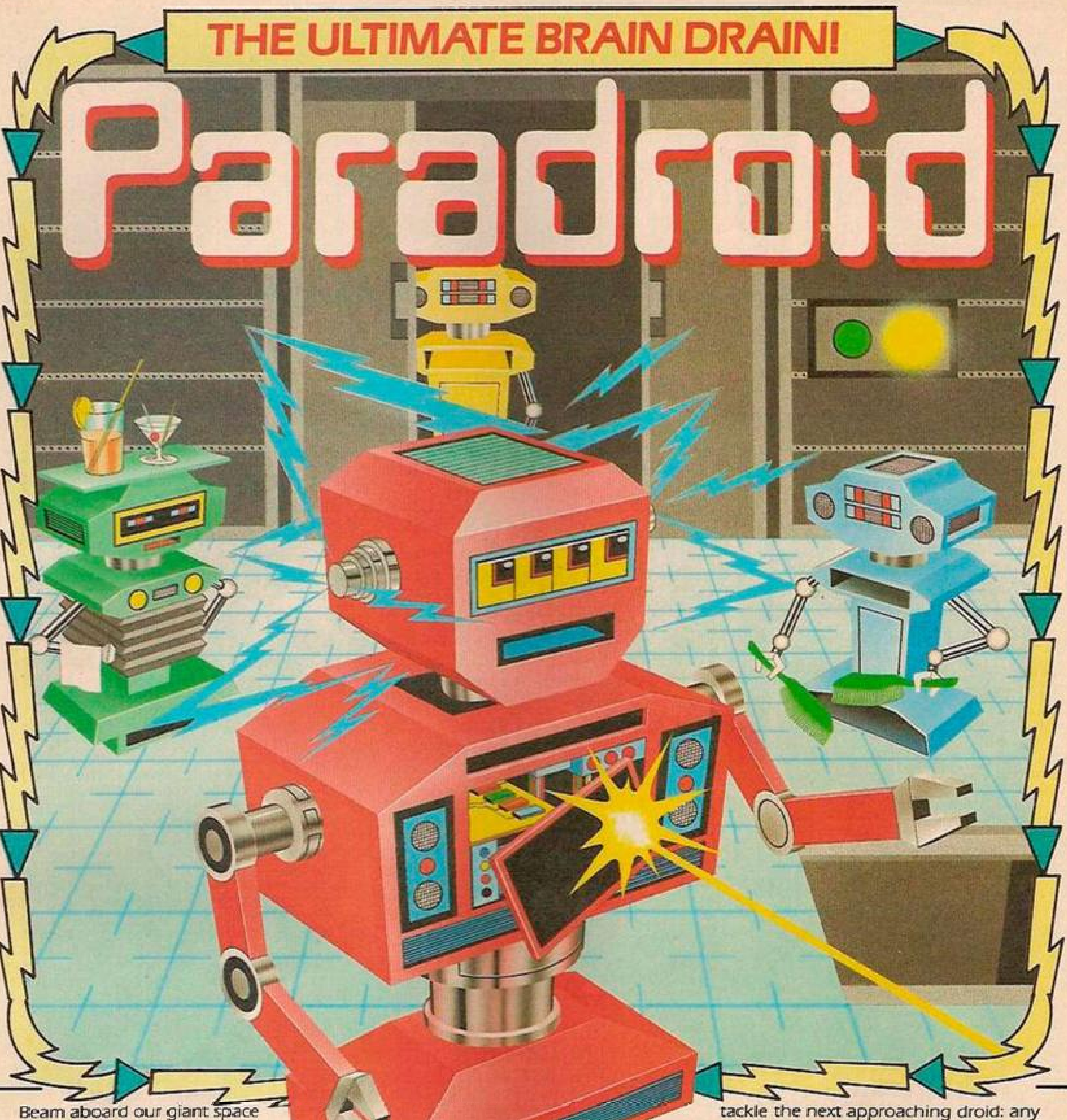
If you do not have the time to type in the listings, I can supply cassette copies of the game for £2.50. Please send cheques or postal orders made payable to Shingo Sugiura to the following address: 20 Oakfield Gardens, Dulwich Wood Avenue, London SE19 1HF. ■

Listing 3.

```
10REM Machine code
20REM By Shingo Sugiura
30REM (C) July 1985
40
50HIMEM=&2A30:def=&2C50
60hdata=&2053
70PROCass
80CHAIN"ESCAPE"
90END
100DEFPROCass
110ad1=&70:ad2=&72:temp=&2A:temp1=&2C:work=&60:score=&80:sdata=&2F90
120oswrch=&FFEE:osword=&FFF1:osbyte=&FFF4
130FORpass=0TO2STEP2:P%=&A00
140[OPTpass
150.print
160PHA:JSR address:PLA
170JSR calc:JSR sprite
180CLC:LDA ad1:ADC#&80:STA ad1
190LDA ad1+1:ADC#2:STA ad1+1
200CLC:LDA ad2:ADC#32:STA ad2
210LDA ad2+1:ADC#0:STA ad2+1
220JMP sprite
230.sprite LDY#31
240.loop
250LDA(ad2),Y:STA(ad1),Y:DEY:BPL loop
260RTS
270.blank
280JSRaddress:JSRerase
290CLC:LDA ad1:ADC#&80:STA ad1:LDA ad1+1:ADC#2:STA ad1+1
300JMPerase
310.erase LDA#0:LDY#31:.bloop STA(ad1),Y:DEY:BPLbloop
320RTS
330.address
340TYA:STA ad1+1:ASL A:ASL A
350CLC:ADC ad1+1:STA ad1+1:LDA#0:STAad1
360TXA
370STA temp+1
380LDA#0:STA temp
390LSR temp+1:ROR temp:LSR temp+1:ROR temp:LSR temp+1:ROR temp
400CLC:LDA ad1:ADC temp:STA ad1
410LDA ad1+1:ADC temp+1:ADC#&30:STAad1+1
420RTS
430.calc
440STAtemp+1:LDA#0:STAtemp
450LSRtemp+1:RORtemp
460LSR temp+1:ROR temp
470CLC
480LDA temp:ADC#FNlo(def):STAad2
490LDA temp+1:ADC#FNhi(def):STAad2+1
500RTS
510.screen
520LDA#12:JSRoswrch
530LDY#0
540.sloop
550LDA sdata,Y:JSRoswrch:INY:CPY#44:BNE sloop
560LDA#19:STA temp1:.row
570LDA#11:STA temp1+1:.col
580LDX temp1:LDY temp1+1:LDA#12:JSR print
590DEC temp1+1:BPLcol
600DEC temp1:BPL row
610LDX#10:LDY#6:LDA#10:JSRprint
620JMPpscore
630.pscore
640LDAscore:STAad1:LDAscore+1:STAad1+1:LDX#6:LDY#26:JMPp_dec
650.hall
660LDX#0:.hloop LDA hdata,X:CMP#&FF:BEQschf:JSRoswrch
670INX:BNE hloop
680.schf RTS
690]
700P%=&D00
710[OPTpass
720.double
730STA work:TXA:PHA:TYA:PHA
740LDA#&A:LDX#FNlo(work):LDY#FNhi(work):JSRosword
750LDA#23:JSRoswrch:LDA#255:JSRoswrch
760LDX#1
770.t_loop
780LDA work,X
790JSR oswrch:JSRoswrch
800INX:CPX#5
810BNE t_loop
820LDA#255:JSRoswrch:LDA#23:JSRoswrch:LDA#255:JSRoswrch
830.b_loop
840LDA work,X
850JSR oswrch:JSRoswrch
860INX:CPX#9:BNE b_loop
870LDA#8:JSRoswrch:LDA#10:JSRoswrch:LDA#255:JSRoswrch:LDA#11:JSRoswrch
880PLA:TAY:PLA:TAX:RTS
890.p_dec
900LDA#31:JSRoswrch:TXA:JSRoswrch:TYA:JSRoswrch
910LDY#0
920.ploop LDX#16:LDA#0
930.digit ASL ad1:ROL ad1+1:ROL A
940CMP#10:BCC sbd4:SBC#10:INC ad1
950.sbd4 DEX:BNE digit
960PHA:INY:LDA ad1+1:ORA ad1:CPY#5:BNE ploop
970.sbd5 PLA:CLC:ADC#48:JSR double
980DEY:BNE sbd5
990LDA#48:JMP double
1000.inc_sc
1010CLC:LDAscore:ADC#1:STAscore:STAad1:LDAscore+1:ADC#0:STAscore+1:STAad1+1
1020LDA#17:JSRoswrch:LDA#3:JSRoswrch:LDX#6:LDY#26:JMPp_dec
1030.sound
1040LDX#&EF:JSRinkey:BEQnot_quiet
1050LDA#210:LDY#&00:LDX#&01:JMPosbyte
1060.not_quiet
1070LDX#&AE:JSRinkey:BEQnot_noisy
1080LDA#210:LDY#&00:LDX#&00:JMPosbyte
1090.not_noisy
1100RTS
1110.inkey
1120LDY#&FF:LDA#&81
1130JSR osbyte
1140TXA
1150RTS
1160]
1170NEXT
1180ENDPROC
1190DEFFNlo(N%)
1200=N%MOD256
1210DEFFNhi(N%)
1220=N%DIV256
```

Listing 4.

```
10REM Hermann in the Great Escape
20REM (C) July 1985
30
40MODE1:HIMEM=&2A30
50DIM maze%(19,11),S%(8),mc%(1,9),dir%(9),Z% 5
60PROCdefine:PROCcast
70REPEAT
80!&80=0:W%=0
90MODE1:HIMEM=&2A30:VDU23;8202;0;0;0;
100PROCgame
110MODE7:HIMEM=&2A30:PROCtable
120UNTILFALSE
130
140DEFPROCgame
150REPEAT
160PROCinit
170REPEAT
180PROCman:PROCbaddie:CALLADBB
190UNTILF% OR R%
200IF F% PROCdead ELSE PROCnew_screen
210UNTILF%
220ENDPROC
230DEFPROCman
240T%=50-INT(TIME/50):IF T%<=0 F%=TRUE:T%=0
250COLOUR1:PRINTTAB(bx%,by%);:IFT%<10 PRINT;T%;" " ELSE PRINT;T%
260IF INKEY-66 PROCleft ELSEIF INKEY-89 PROCright
270px%=xc%:py%=yc%
280xc%=xc%+(INKEY-98)-(INKEY-67)
290yc%=yc%+(INKEY-73)-(INKEY-105)
300IFxc%<0 xc%=19 ELSE IFxc%>19 xc%=0
310IFyc%<0 yc%=11 ELSE IFyc%>11 yc%=0
320IFpx%=xc% AND py%=yc% ENDPROC
330P%=maze%(xc%,yc%):IFP%=13 xc%=px%:yc%=py%:ENDPROC
340X%=px%:Y%=py%:CALL&B32:maze%(X%,Y%)=13
350X%=xc%:Y%=yc%:A%=10:CALL&B00:IF P%<>12 PROCweap
360maze%(X%,Y%)=10:CALLAD99:PROCmusic
370ENDPROC
380DEFPROCweap
390IFP%=11 AND U%<5 F%=TRUE:ENDPROC ELSEIFP%=11 AND U%=5 R%=TRUE:ENDPROC
400IFP%>4 PROCbonus:SOUND3,2,10,10:FORA%=0TO5:CALLAD99:NEXT
410IFP%<5 F%=TRUE
420ENDPROC
430DEFPROCbonus
440COLOUR2:PRINTTAB(19+U%*2,29)CHR$(240+(P%-5)*2)TAB(19+U%*2,30)CHR$(241+(P%-5)*2)
450U%=U%+1:B$=B$+CHR$(240+(P%-5)*2)
460ENDPROC
470DEFPROCleft
480T%=maze%(0,yc%):SOUND&13,2,1,5
490FORA%=0TO18:maze%(A%,yc%)=maze%(A%+1,yc%):NEXT
500maze%(19,yc%)=T%:Y%=yc%:xc%=xc%-1:IFxc%<0 xc%=19
510FORX%=0TO19:A%=maze%(X%,yc%):IFA%>12 CALL&B32 ELSE CALL&B00
520NEXT
530FORA%=0TO9:IFyc%=mc%(1,A%) mc%(0,A%)=mc%(0,A%)-1
540IFmc%(0,A%)<0 mc%(0,A%)=19
550NEXT
560IFyc%=(by%-1)/2 bx%=bx%-2:IF bx%<0 bx%=38
570ENDPROC
580DEFPROCright
590T%=maze%(19,yc%):SOUND&13,2,1,5
600FORA%=19TO1STEP-1:maze%(A%,yc%)=maze%(A%-1,yc%):NEXT
610maze%(0,yc%)=T%:Y%=yc%:xc%=xc%+1:IFxc%>19 xc%=0
620FORX%=0TO19:A%=maze%(X%,yc%):IFA%>12 CALL&B32 ELSE CALL&B00
630NEXT
640FORA%=0TO9:IFyc%=mc%(1,A%) mc%(0,A%)=mc%(0,A%)+1
650IFmc%(0,A%)>19 mc%(0,A%)=0
660NEXT
670IFyc%=(by%-1)/2 bx%=bx%+2:IF bx%>38 bx%=0
680ENDPROC
690DEFPROCbaddie
700M%=RND(10)-1
710px%=mc%(0,M%):py%=mc%(1,M%):D%=dir%(M%)
720x%=px%+(D%=1)-(D%=2):IFx%>19 x%=0 ELSE IF x%<0 x%=19
730y%=py%+(D%=3)-(D%=4):IFy%>11 y%=0 ELSE IFy%<0 y%=11
740P%=maze%(x%,y%)
750IF(P%<>10 AND P%<>12) dir%(M%)=RND(4):ENDPROC
760IFP%=10 F%=TRUE
770X%=px%:Y%=py%:maze%(X%,Y%)=12:A%=12:CALL&B00
780X%=x%:Y%=y%:mc%(0,M%)=X%:mc%(1,M%)=Y%:A%=M% MOD5
790CALL&B00:maze%(X%,Y%)=M% MOD5
800IF RND(10)<2 dir%(M%)=RND(4)
810ENDPROC
820DEFPROCinit
830FORX%=0TO19:FORI%=0TO11:maze%(X%,I%)=12:NEXT,
840?&82=0:R%=FALSE:U%=0:W%=W%+1:xc%=10:yc%=6:maze%(10,6)=10:B$=""
850CALL&B9F:!&70=S%(0):X%=26:Y%=26:CALL&D5D
860PRINTTAB(7,29);:A%=ASC"0"+W%:CALL&D00
870F%=FALSE
880A%=5:REPEAT
890X%=RND(20)-1:Y%=RND(12)-1
900IFmaze%(X%,Y%)=12 maze%(X%,Y%)=A%:CALL&B00:A%=A%+1
910UNTILA%=10
920C%=0:REPEAT
930X%=RND(20)-1:Y%=RND(12)-1
940IFmaze%(X%,Y%)=12 mc%(0,C%)=X%:mc%(1,C%)=Y%:maze%(X%,Y%)=C% MOD5:dir%(C%)=RND(4):A%=C% MOD5:CALL&B00:C%=C%+1
950UNTILC%=10
960C%=0:REPEAT
970X%=RND(20)-1:Y%=RND(12)-1
980IFmaze%(X%,Y%)=12 A%=11:CALL&B00:maze%(X%,Y%)=A%:C%=C%+1
990UNTILC%=1:bx%=X%*2:by%=Y%*2+1:COLOUR1:PRINTTAB(bx%,by%)"50"
1000IF W%=1 PROCintro:ENDPROC
1010C%=0:REPEAT
1020X%=RND(20)-1:Y%=RND(12)-1
1030IFmaze%(X%,Y%)=12 CALL&B32:maze%(X%,Y%)=13:C%=C%+1
1040UNTILC%=W%*2:PROCintro
1050ENDPROC
1060DEFPROCdead
1070SOUND&11,3,0,10:SOUND&12,3,48,10:SOUND&13,3,96,10
1080PROCdelay(10000)
1090FORA%=0TO101STEP3
1100C%=A%?&2BE0:P%=A%?&2BE1:D%=A%?&2BE2:SOUNDC%,1,P%,D%:CALLADBB:NEXT
1110PROCdelay(10000)
1120ENDPROC
1130DEFPROCmusic
1140IF ADVAL(-6)<15 ENDPROC
1150?&82=?&82+1:O%=?&82 MOD47
1160P%=O%?&2AF0:D%=O%?&2B1F
1170SOUND1,1,P%,D%:SOUND2,1,P%-48,D%
1180ENDPROC
1190DEFPROCnew_screen
1200IF T$<>B$ SOUND&11,1,101,15:SOUND&12,1,117,15:SOUND&13,1,129,15 ELSE PROCsuper
1210PROCdelay(5000)
1220ENDPROC
1230DEFPROCsuper
1240SOUND&11,0,0,0:SOUND&12,0,0,0
1250FORA%=1TO100
1260COLOURA%:CALLADBB
1270PRINTTAB(19,29)CHR$240+" "+CHR$242+" "+CHR$244+" "+CHR$246+" "+CHR$248
1280PRINTTAB(19,30)CHR$241+" "+CHR$243+" "+CHR$245+" "+CHR$247+" "+CHR$249
1290PROCdelay(100):CALLAD99:SOUND&11,-15,A%,1
1300NEXT
1310ENDPROC
1320DEFPROCintro
1330IF W%>1 PROCdelay(5000):TIME=0:ENDPROC
1340FORA%=0TO67STEP2:P%=A%?&2FBC:D%=A%?&2FBD
1350SOUND1,1,P%,D%:SOUND2,1,P%-48,D%:CALLADBB
1360NEXT:PROCdelay(10000):TIME=0
1370ENDPROC
1380DEFPROCdelay(T%)
1390FORD%=1TOT%:NEXT
1400ENDPROC
1410DEFPROCdefine
1420T$=CHR$240+CHR$242+CHR$244+CHR$246+CHR$248:N%=&2A30
1430FORL%=0TO7:S%(L%)=100-10*L%:NEXT
1440ENDPROC
1450DEFPROCtable
1460PROCammend:CLS
1470PRINTCHR$129CHR$157CHR$130CHR$141TAB(12)"GREATEST HEROES"
1480PRINTCHR$129CHR$157CHR$130CHR$141TAB(12)"GREATEST HEROES"'
1490PRINTTAB(10)CHR$134CHR$141"Today's Greatest"
1500PRINTTAB(10)CHR$134CHR$141"Today's Greatest"'
1510FORI%=0TO7
1520VDUI%+49,46:PRINTTAB(6);S%(I%)*10;TAB(12)"... ";$(N%+I%*20)'
1530NEXT
1540PRINTTAB(2,23)CHR$134CHR$136"Press the SPACE BAR to replay.";
1550REPEAT:CALLADBB:UNTILINKEY-99
1560ENDPROC
1570DEFPROCammend
1580IF(!&80 AND &FFFF)<=S%(7) ENDPROC
1590FORI%=7TO0 STEP-1
1600IF(!&80 AND&FFFF)>S%(I%) S%(I%+1)=S%(I%):$(N%+(I%+1)*20)=$(N%+I%*20):F%=I%
1610NEXT
1620S%(F%)=!&80 AND &FFFF
1630CALL&BE5:*FX15
1640!Z%=N%+F%*20:Z%?2=19:Z%?3=32:Z%?4=127
1650X%=Z% MOD &100:Y%=Z% DIV &100:A%=0:CALL&FFF1
1660IF$(N%+F%*20)="" $(N%+F%*20)="MAN WITH NO NAME"
1670ENDPROC
1680DEFPROCcast
1690COLOUR3:PRINTTAB(15)"C A S T":*FX15
1700PROCsp(2,2,10):COLOUR2:PRINTTAB(8,4)"Hermann":PROCsp(11,2,0):COLOUR3:PRINTTAB(25,4)"Skeletor"
1710PROCsp(2,4,1):PRINTTAB(8,8)"Mad Ax":PROCsp(11,4,2):PRINTTAB(25,8)"Pinceman"
1720PROCsp(2,6,3):PRINTTAB(8,12)"Robed one":PROCsp(11,6,4):PRINTTAB(25,12)"Winged Man"
1730PRINTTAB(0,15)
1740PRINTTAB(15)"CONTROLS:"''
1750PRINTTAB(29)"*"''TAB(29)CHR$250
1760PRINTTAB(25)"Z "CHR$251TAB(31,VPOS)CHR$253" X"
1770PRINTTAB(29)CHR$252''TAB(29)"?"
1780PRINTTAB(3,22)"A "CHR$251" SCROLL "CHR$253" J"
1790COLOUR2:PRINTTAB(6,31)"PRESS THE SPACE BAR TO PLAY";
1800REPEAT:CALLADBB:UNTIL GET=32
1810ENDPROC
1820DEFPROCsp(X%,Y%,A%)
1830CALL&B00:ENDPROC
```



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BLOKKER

BLOKKER consists of a number of moving objects leaving trails. The player controls one of these and must avoid all the trails, including his own, and the sides of the screen, whilst trying to force his opponents to hit something and hence die. If all the enemy are killed, the player reaches a new sheet. As the sheets progress the enemy become faster and more plentiful. If the player runs out of fuel he dies, but fuel remaining at the end of a sheet earns a points bonus. The game includes, of course, a high score table.

As the game is all in machine code typing it in is simple but boring. First you should make sure you have a tape or disc with space on it. When you are ready, type in the Basic listing. this is a loader for the machine code. On running — it may be a good idea to save it first — you will see a number on the screen. This should correspond to the first number in the code dump. You should now input the next 20 digits in one string.

When you have done so there should be an equals sign displayed. Now type in and enter the last number in the first line of the dump. If all is well you should get a number 10 bigger than the first on the next line and you can repeat the process as before.

Eventually the computer will tell you you have finished. Hopefully this will be at the end of the dump. You can now save the machine code. First make a copy saved ordinarily i.e.:

SAVE "BLOCKCODE",b,&7000,3980

or the equivalent disc command. This copy can be run by loading it and calling &7000. You may like to use a Basic loader for this of the form:

```
10 MEMORY &6FFO
20 load""
30 call &7000
```

The loader would need to precede the code on tape. If on disc a file name would need to be put in line 20.

Saved to autorun

Alternatively the code can be saved so as to autorun by saving it with the line SAVE"BLOKKER",b,&7000,3980,&7000.

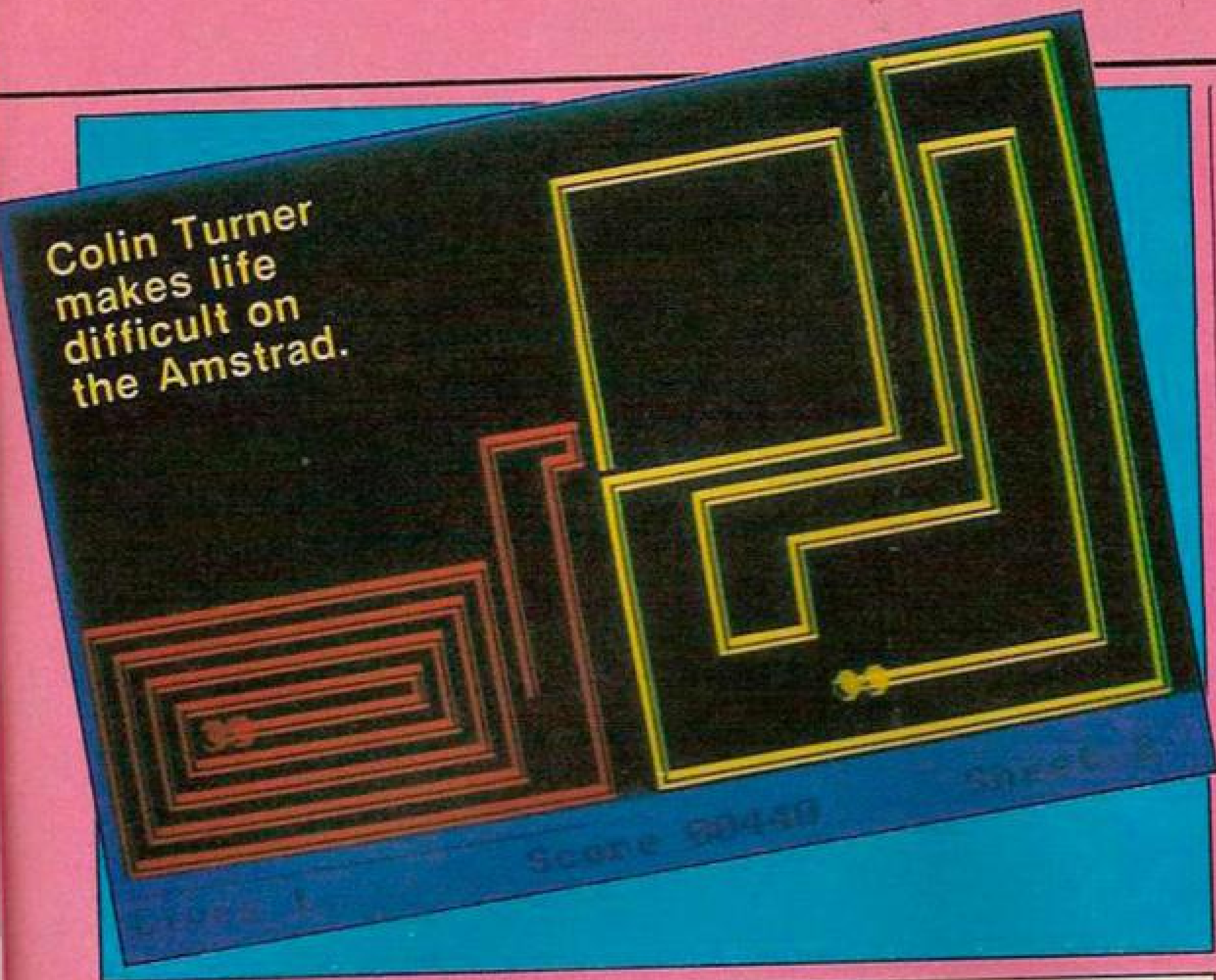
Please note that if this is done it is impossible to return from the game to Basic and the game must be run and not loaded.

The keys used for playing the game are given when the game is run, but there are other keys which can be used to control the program

TAB	pauses the game
ESC	aborts a game
CLR and ESC	return to Basic if possible.

Code dump.

```
28672: CD987921B876CD3D75Ø1 = 1197
28682: DCØ5CDB1711808CD1D74 = 1102
28692: CDØF7338183EØ1CDB4BB = 1050
28702: CD6CBB3EØØCDB4BB2181 = 1296
28712: 75CD3D75CDØF733ØEØ21 = 1140
28722: 5E72CD2B71CD597Ø3E42 = 1103
28732: CD1EBB28ØE212271CDF7 = 1108
28742: 7Ø3E1ØCD1EBBCØ18CAED = 1267
28752: 5B917FCD327318C1C9CD = 1356
28762: 4A79CD7079CD89793E42 = 1224
28772: CD1EBBCØCDA477CD267D = 1470
28782: 3ØØFCDF4743A937F3D32 = 1071
28792: 937FFEØØC818DDCDF777 = 1544
28802: 3ØØFCDF4743A937F3D32 = 1071
28812: 937FFEØØC818C9CD447F = 1353
28822: 3ØC7211972CD2B71CD15 = 1006
28832: 753AA97F3C32A97F3A9Ø = 1079
28842: 7F3C32907FFEØ62ØA93E = 1031
28852: Ø132907F3AA87F3C32A8 = 953
28862: 7F189BF5C5D5E5ED4BC6 = 1700
28872: 7FED5BC47F151DCB23CB = 1269
28882: 237B825F16ØØ7C21E77Ø = 905
28892: 195682CDØ27BE1D1C1F1 = 1439
28902: C9Ø3Ø6ØØØ5ØØ4Ø5ØØØØ = 232
28912: Ø7Ø3Ø8Ø7ØØØ6Ø4F5C5D5 = 690
28922: E5DDE5CDAABCDDE1E1D1 = 2122
28932: C1F1C982ØØØ1C8ØØØØØF = 981
28942: E8Ø382ØØØ2E8Ø3ØØØFFF = 872
28952: 7F82ØØØ2F4Ø1ØØØFFF7F = 901
28962: 87ØØØØØØØØØØØØØØ1ØØF5 = 381
28972: C5D5E5DDE57E32BB7F23 = 1614
28982: 7E32BC7F237E32CØ7F23 = 1056
28992: 4E234623ED43C17F4E23 = 955
29002: 462378A1FEFF2ØØF4E23 = 1055
29012: 462378B1FEØØ284ECDB1 = 1156
29022: 7118E73EB132BA7FED43 = 1274
29032: BD7FC5E521BA7FCDAABC = 1651
29042: E1C13EAA32BA7FE56Ø69 = 1443
29052: Ø9444DE1ED43BD7FC5E5 = 1425
29062: 21BA7FCDAABCE1C13E9C = 1545
29072: 32BA7FE56Ø69Ø9444DE1 = 1172
29082: ED43BD7FC5E521BA7FCD = 1597
29092: AABCE1C1189EDDE1E1D1 = 1838
29102: C1F1C9F5C5E5D521ØØØØ = 1552
29112: 11ØØØØCD1ØBDCDØDBD7C = 958
29122: B82ØF97DB92ØF5D1E1C1 = 1679
29132: F1C9Ø1ØØØFØØØØ92Ø1FF = 860
29142: FF2DØØAAØ1FFFF2DØØDE = 1248
29152: Ø1FFFF2DØØ92Ø1FFFF2D = 1258
29162: ØØAAØ1FFFF2DØØDEØ1FF = 1204
29172: FF2DØØFAØ1FFFF2DØØAA = 1276
29182: Ø1FFFF2DØØDEØ1FFFF5A = 1379
29192: ØØ7EØ2FFFF5AØØBCØ3FF = 1174
29202: FFØEØ1FFFFØØØØØ2ØØØF = 797
29212: ØØØØ3CØØFFFF5AØØ5ØØØ = 740
29222: FFFF3CØØ5ØØØFFFF1EØØ = 1190
29232: 3CØØFFFF5AØØ35ØØFFFF = 1223
29242: 5AØØ2FØØFFFF5AØØ35ØØ = 790
29252: FFFF1EØØ2FØØFFFF1EØØ = 1127
29262: 35ØØFFFF1EØØ3CØØFFFF = 1163
29272: 5AØØFFFFØØØØØ1ØØØFØØ = 616
29282: ØØ5FØØFFFF43ØØ6AØØFF = 1033
29292: FF21ØØ77ØØFFFF43ØØ5F = 1079
29302: ØØFFFF21ØØ59ØØFFFF43 = 1209
29312: ØØ5FØØFFFF21ØØ6AØØFF = 999
29322: FF43ØØ59ØØFFFF21ØØ5F = 1049
29332: ØØFFFF43ØØ6AØØFFFF21 = 1226
29342: ØØ77ØØFFFF43ØØ5FØØFF = 1046
29352: FF21ØØ6AØØFFFF64ØØ9F = 1163
29362: ØØFFFF64ØØ5FØØFFFF43 = 1282
29372: ØØ6AØØFFFF21ØØ77ØØFF = 1023
29382: FF43ØØ5FØØFFFF21ØØ59 = 1049
29392: ØØFFFF43ØØ5FØØFFFF21 = 1215
29402: ØØ6AØØFFFF43ØØ59ØØFF = 1027
29412: FF21ØØ5FØØFFFF43ØØ6A = 1066
29422: ØØFFFF21ØØ77ØØFFFF43 = 1239
29432: ØØ7FØØFFFF21ØØ77ØØFF = 1044
29442: FF64ØØE/ØØFFFF87ØØFF = 1494
29452: FFØØØØC5E5D5Ø6Ø1115Ø = 998
29462: C33E2FCD1EBB28Ø537D1 = 1035
29472: E1C1C91B7AB3FEØØ2ØED = 1470
29482: 1ØE8373FD1E1C1C9F5C5 = 1636
29492: D5E5DDE5DD2173740608 = 1391
29502: DD6EØØDD66Ø1373FED52 = 1092
29512: 38ØBD5111ØØØDD19D11Ø = 784
29522: EB1875C5CB2ØCB2ØCB2Ø = 1278
29532: CB2Ø48Ø6ØØD511F27421 = 934
29542: E274EDB8D1DD73ØØDD72 = 1643
29552: Ø1DD36Ø22ØDD36Ø32ØDD = 841
29562: 36Ø42ØDD36Ø52ØDD36Ø6 = 683
29572: 2ØDD36Ø72ØDD36Ø82ØDD = 882
29582: 36Ø92ØDD36ØA2ØDD36ØB = 698
29592: 2ØDD36ØC2ØDD36ØD2ØDD = 892
29602: 36ØE2ØDD36ØF2ØCD1D74 = 772
29612: 21A376CD3D75C13EØ89Ø = 1104
29622: CB27C6Ø56F2611CD75BB = 1120
29632: DDE5E12323Ø6ØECDD173 = 1294
29642: DDE1E1D1C1F1C9F5C5E5 = 2186
29652: D5F5C5D5E5CDØ3BBE1D1 = 1926
29662: C1F1ØEØØCDØ6BBFEØD28 = 1153
29672: 2FFE7F2Ø153EØØB928FØ = 1008
29682: 2B362ØØD3EØ8CD5ABB3E = 756
29692: 1ØCD5ABB18EØFE2Ø38DC = 1308
29702: FE8Ø3ØD85779B828D372 = 1403
29712: 23ØC7ACD5ABB18CAD1E1 = 1311
29722: C1F1C9F5C5D5E53EØ1CD = 1787
29732: B4BBCD6CBB3EØØCDB4BB = 1501
29742: 217175CD3D7511737406 = 900
29752: Ø83EØ89ØCB27C6Ø56F26 = 816
29762: ØBCD75BBC51A4F131A47 = 938
29772: 13CD6278CD17793E2ØCD = 1090
29782: 5ABBØ6ØE21AA7F1A7713 = 791
29792: 231ØFA36FF21AA7FCD3D = 1206
29802: 75C11ØCBE1D1C1F1C934 = 1650
29812: Ø8536F617Ø792Ø746865 = 885
29822: 2Ø3173742ØØ8Ø7546865 = 648
29832: 2Ø5365636F6E642Ø2Ø2Ø = 732
29842: 2ØDCØ55468652Ø546869 = 871
29852: 72642Ø2Ø2Ø2Ø2ØBØØ44E = 632
29862: 756D6265722Ø466F7572 = 983
29872: 2Ø2Ø2Ø84Ø34E616D652Ø = 648
29882: 466976652Ø2Ø2Ø2Ø2Ø58 = 642
29892: Ø25369787468205Ø6572 = 857
29902: 736F6E2Ø2Ø2CØ1377468 = 720
29912: 2Ø537472616E67657220 = 902
29922: 2Ø2ØØØØØ427574206E6F = 616
29932: 742Ø6C656173742ØF5C5 = 1159
29942: D5E53EØ1Ø61AØEØFCD32 = 821
29952: BC21CE71CD2B713EØ1Ø6 = 970
29962: 18ØE18CD32BCE1D1C1F1 = 1373
29972: C9C5E521Ø771CDF77Ø3E = 1406
29982: Ø1328D7FCDF77738ØDCD = 1164
29992: F77738Ø8Ø1Ø1ØØCD3978 = 814
30002: 18EE212271CDF77ØE1C1 = 1424
30012: C9F5E57EFEFF28Ø6CD5A = 1651
30022: BB2318F5E1F1C91FØ1Ø2 = 1192
30032: 4C697665731F1ØØ25363 = 746
30042: 6F72651F2ØØ253686565 = 780
30052: 74FF1FØ7Ø22Ø2Ø1F26Ø2 = 546
30062: 2Ø2ØFF1FØFØ2546F7Ø2Ø = 706
30072: 426C6F6B6B657273FF1F = 1115
30082: ØEØ2ØFØ1422Ø4C2Ø4F2Ø = 349
30092: 4B2Ø4B2Ø452Ø521FØEØ4 = 446
30102: ØFØ342792Ø43542Ø696E = 635
30112: 2Ø313938351FØ3Ø7ØFØ1 = 304
30122: 546865204F626A656374 = 920
30132: 2Ø6F662Ø746865204761 = 798
30142: 6D652Ø6973207Ø746F2Ø53 = 836
30152: 75727669766 5ØAØD546F = 891
30162: 2Ø686974207Ø36F6D6574 = 941
30172: 68696E672C6576656E2Ø = 928
30182: 796F757273656C662C69 = 1038
30192: 732Ø746F2Ø4469655468 = 868
30202: 652Ø656173696573742Ø = 915
30212: 7761792Ø746F2Ø556E64 = 923
30222: 65727374616E642Ø6973 = 1005
30232: 2Ø746F2Ø5Ø6C61791F11 = 745
30242: ØA486F6E6573746C791F = 895
30252: ØBØD4B4559533A1F14ØE = 463
30262: 5D2Ø55701F14ØF5C2Ø44 = 580
30272: 6F776E1F14105A2Ø4C65 = 706
30282: 66741F14115820526967 = 696
30292: 68741F1Ø125368696674 = 795
30302: 2Ø666F722Ø537Ø656564 = 888
30312: 1FØ514596F752Ø6D6179 = 732
30322: 2C6F662Ø636F75727365 = 946
30332: 2C7573652Ø612Ø4A6F79 = 844
30342: 737469636B1FØC161853 = 714
30352: 5Ø41434520424152Ø254 = 642
30362: 4F2Ø535441525418FF1F = 819
30372: ØD16184 56E7465722Ø59 = 690
30382: 6F7572204E616D6518FF = 1038
30392: 1FØEØ242204C2Ø4F2Ø4B = 439
30402: 2Ø4B2Ø452Ø521FØ8Ø941 = 435
30412: 6C6C2Ø42797465732Ø5Ø = 879
30422: 726F6772616D6D65642Ø = 990
30432: 62792Ø43541FØ6ØA496E = 632
30442: 2Ø7468652Ø7365636F6E = 921
30452: 642Ø7765656B2Ø6F662Ø = 837
30462: 4A756C792Ø27383 51FØ8 = 639
30472: ØB466F722Ø596F75722Ø = 801
30482: 436F6D7Ø757465722Ø6D = 988
30492: 6167617A696E651FØ71Ø = 789
30502: 5468616E6B732Ø746F2Ø = 908
30512: 4D722Ø53746576656E2Ø = 884
30522: 436F7Ø656C616E641FØA = 847
30532: 11466F722Ø4A696E676C = 844
30542: 6573Ø616E642Ø546869 = 880
30552: 6E6773FFF5C5E53EØ2CD = 1523
30562: B4BB26262EØ2CD75BB3A = 1058
30572: A97F4FØ6ØØCD6278CD2C = 1053
30582: 793EØØCDB4BBE1C1F1C9 = 1615
30592: F5C5E53A937F4FØ6ØØCD = 1293
30602: 62783EØ2CDB4BB26Ø72E = 945
30612: Ø2CD75BBCD2C793EØØCD = 1148
30622: B4BBE1C1F1C9F5E5C5DD = 2119
30632: E53E44CD1EBB281BCDB6 = 1235
```



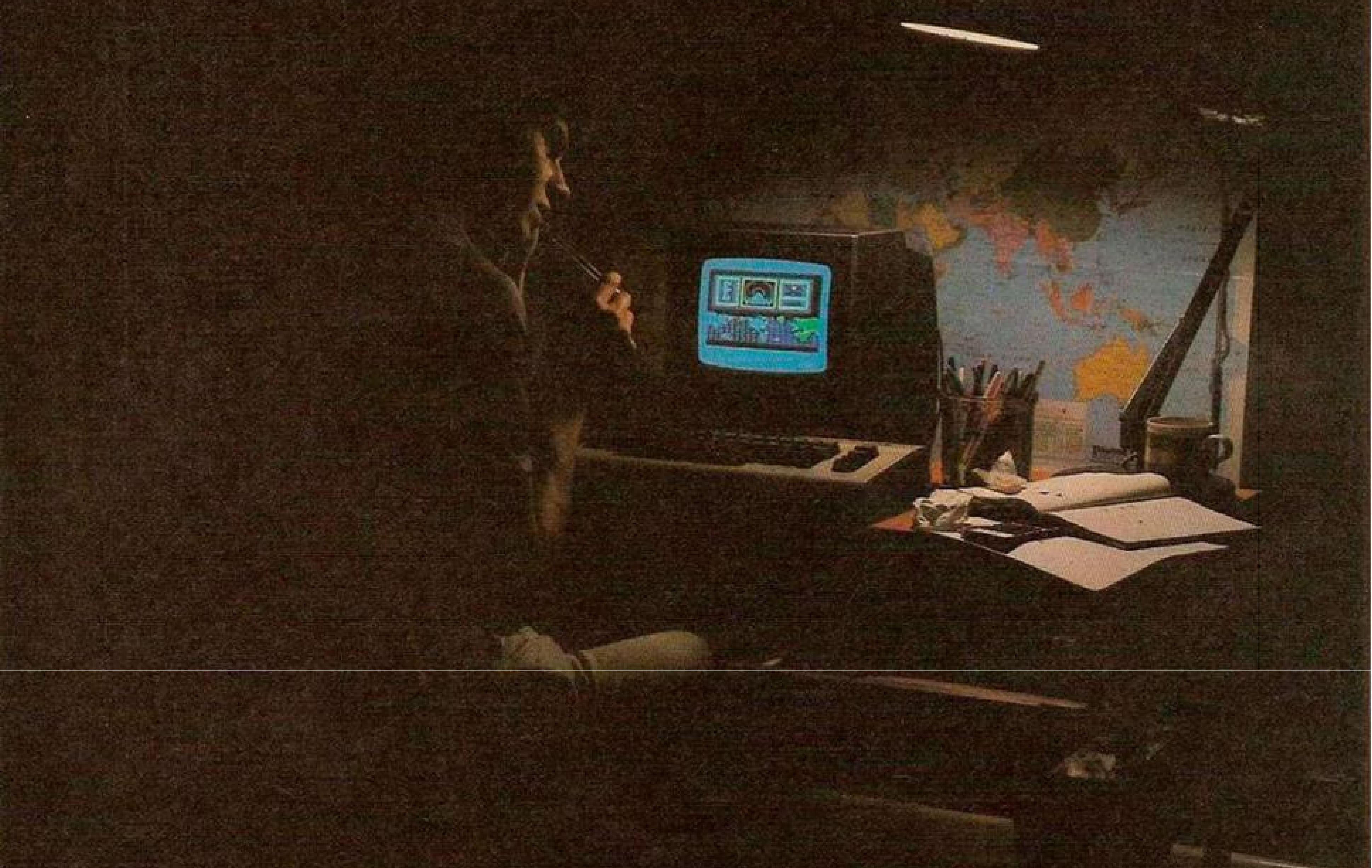
Basic program.

```
10 REM Basic code loader
15 MEMORY 28670
40 FOR a=0 TO 3970 STEP 10
50 PRINT a+28672;":";
70 INPUT a$:x=0:t=0
75 FOR n=1 TO LEN(a$) STEP 2
80 p=VAL("&"+MID$(a$,n,2))
90 POKE (a+x+28672),p
100 t=t+p:x=x+1
110 NEXT
115 PRINT "= ";
120 INPUT c
130 IF c<>t THEN PRINT CHR$(7)
;"Error in Data":GOTO 50
140 NEXT
150 PRINT"Data Entered Correct
ly"
```

```
30642: BC3E44CD1EBB20F93E44 = 1151
30652: CD1EBB20F93E44CD1EBB = 1263
30662: 20F9CDB9BCDDE1C1E1F1 = 1964
30672: C9F5C5D5E5213F0122A6 = 1382
30682: 7F3E00CDDEBB11000021 = 853
30692: 1600CDEABB1180022116 = 850
30702: 00CDF6BBE1D1C1F1C9F5 = 1952
30712: C5D5E53E03CDDEBB3A8D = 1517
30722: 7FFE0120040601180206 = 457
30732: 03C5ED5BA67FEB29EB21 = 1365
30742: 1600CDEABB2AA67F7CB5 = 1288
30752: FE002007C1E1D1C1F137 = 1409
30762: C92B22A67FC110DBE1D1 = 1433
30772: C1F1373FC9F5E5C52A91 = 1611
30782: 7F0922917F3E02CDB4BB = 1078
30792: 26162E02CD75BBED4B91 = 1074
30802: 7FCD6278CD17793E00CD = 1166
30812: B4BBC1E1F1C9F5C5E5D5 = 2111
30822: 219C7F229A7FED43947F = 1210
30832: 060421C97822987F2A98 = 871
30842: 7F4E2322987F2A987F5E = 968
30852: 23562322987F2A947F37 = 841
30862: 3FED5222967F30070D79 = 882
30872: FEFF20E40C2A9A7F7123 = 1252
30882: 229A7F2A967F22947F2A = 985
30892: 987F79FE00280523230D = 782
30902: 18F622987F10BB2A9A7F = 1109
30912: 3A947F77D1E1C1F1C906 = 1527
30922: 60EA50C3409C3075204E = 1100
30932: 10270000092823401F58 = 322
30942: 1B70178813A00FB80BD0 = 895
30952: 07E80300000984032003 = 421
30962: BC025802F40190012C01 = 715
30972: C80064000000095A0050 = 479
30982: 0046003C00320028001E = 250
30992: 0014000A000000F5C5E5 = 701
31002: 219C7F06057EC630CD5A = 994
31012: BB2310F7E1C1F1C9C5E5 = 1771
31022: F5219C7F06047EFE0020 = 983
31032: 032310F8047EC630CD5A = 973
31042: BB2310F7F1E1C1C90100 = 1346
31052: 00ED43917F3E0332937F = 965
31062: 3E0132907F32A97F0100 = 731
31072: 00CD39783E0032A87F21 = 822
31082: 6675CD3D75C9CDC17ACD = 1528
31092: 9C7DCD417ACDD177CD5C = 1503
31102: 77CD8077211071CDF770 = 1297
31112: C9C5F501983A0B78B1FE = 1416
31122: 0020F9F1C1C93E01CD0E = 1198
31132: BC3E00010000CD32BC3E = 756
31142: 0106180E18CD32BC3E02 = 576
31152: 06060E06CD32BC3E0306 = 546
31162: 0E0E0ECD32BC060E0E0E = 533
31172: CD38BC3E01CDB4BB2100 = 1117
31182: 0016271E16CD66BB3E00 = 669
31192: CDB4BB3E02CDB4BB2600 = 1246
31202: 16271E172E18CD66BB3E = 740
31212: 00CD90BB3E03CD96BBCD = 1348
31222: 6CBB214D75CD3D753E00 = 967
31232: CDB4BB26022E02CD3EBC = 1115
31242: 3E01212B7ACDBCBC3E02 = 906
31252: 212F7ACDBCBC3E012133 = 930
31262: 7ACDBFBC3E02213A7ACD = 1188
31272: BFBCC9010FFF03010FFF = 1125
31282: 02820A010105FF018206 = 541
31292: 040106FC010E0C0615ED = 554
31302: 438B7F3E01328E7F328D = 906
31312: 7F0E0C06153E01CD5E7A = 664
31322: CD027BC9C5E5D521C87F = 1530
31332: 58160019F579FE002807 = 802
31342: 47112A001910FDF177D1 = 993
31352: E1C1C9C5E5D521C87F58 = 1706
31362: 16001979FE0028074711 = 557
31372: 2A001910FD7ED1E1C1C9 = 1290
31382: FE01280DFE02280BFE03 = 872
31392: 2809FE042807C90DC904 = 773
31402: C90CC905C9E5D521BD7A = 1406
31412: 3D5F1600197ED1E1C903 = 967
31422: 040102F5C53E01CDB4BB = 1084
31432: CD6CBB3E00CDB4BB0100 = 1135
31442: 0078FE002814FE292810 = 785
31452: 79FE00280BFE1828073E = 813
31462: 00CD5E7A18053E02CD5E = 813
31472: 7A0478FE2A20DC06000C = 812
31482: 79FE1920D4C1F1C9DDE5 = 1729
31492: FDE5C5D5E5F5CB27CB27 = 1850
31502: CB27CB275F1600FD2148 = 959
31512: 7BFD19050D6069CD1ABC = 1039
31522: E5DDE10608FD7E00DD77 = 1408
31532: 00FD7E01DD7701110008 = 746
31542: DD19110200FD1910E8F1 = 1032
31552: E1D1C1FDE1DDE1C90000 = 1752
31562: 00000000000000000000 = 0
31572: 0000000030C070E0F0F0 = 1056
31582: B0F0B0F090F040E030C0 = 1744
31592: 070E0F0F0B0F0B0F0B0F = 129
31602: 090F0C0F070E30403040 = 296
31612: 30403040304030403040 = 560
31622: 3040000000000F0F0F0F0 = 1072
31632: 0000F0F0000000003040 = 592
31642: 304030703070300030F0 = 760
31652: 0000000030403040F040 = 528
31662: F0400040F0C000000000 = 800
31672: 00000000F0C0F0C00040 = 928
31682: F0403040304000000000 = 528
31692: 30F030F0300030703040 = 896
31702: 30400304030403040304 = 140
31712: 03040304030403040000 = 28
31722: 00000F0F0F0F00000F0F = 90
31732: 000000000030403040307 = 24
31742: 03070300030F00000000 = 31
31752: 030403040F040F040004 = 56
31762: 0F0C0000000000000000 = 27
31772: 0F0C0F0C00040F040304 = 84
31782: 030400000000000030F030F = 43
31792: 0300030703040304E5D5 = 469
31802: 21677C060816007E23E5 = 686
31812: CD1EBBE12801562310F3 = 1068
31822: 1E013E15CD1EBB20093E = 639
31832: 4CCD1EBB200218021E02 = 590
31842: 7A43D1E1C9130148013F = 980
31852: 024B021603490347044A = 329
31862: 04E52A8E7C7EFEFF2008 = 1216
31872: 21907C228E7C18F32322 = 937
31882: 8E7CE1C99070C00000001 = 961
31892: 01010101010100000100 = 7
31902: 000101000000101010001 = 6
31912: 010000101000100000000 = 5
31922: 01010101000101010001 = 8
31932: 0100010000000000000000 = 2
31942: 010100010101010000001 = 7
31952: 0000010000001010000000 = 3
31962: 01010101010100010101 = 9
31972: 0000010001000010100001 = 5
31982: 0101000000000000000000 = 2
31992: 0100000010000101000101 = 6
32002: 0000010000101FFE5D521 = 733
32012: 1E7D3DCB275F160019CD = 805
32022: 777C5F197ED1E1C90204 = 1130
32032: 0103020401033A8D7F32 = 390
32042: 8F7F3A8E7F32C57FCD38 = 1232
32052: 7CFE002803328E7F7832 = 910
32062: 8D7FC5ED4B8B7F3A8E7F = 1370
32072: ED43C67F32C47FCD967A = 1479
32082: ED438B7FCD7B7AFE0020 = 1306
32092: 3C2600CDC1703A8E7F32 = 985
32102: C57F3E01CD5E7ACD027B = 1138
32112: C110CD3A8D7FFE01200F = 1042
32122: 3A8F7FFE012815211071 = 806
32132: CDF770180D3A8F7FFE02 = 1185
32142: 2806211971CDF770373F = 899
32152: C9C137C9F5C5D5E5DDE5 = 1984
32162: 3A907F3DCB27CB27CB27 = 1116
32172: 47808011087E6F260019 = 652
32182: DD2100840606C57E23DD = 977
32192: 77007E23DD77014F7E23 = 861
32202: DD7702477E23DD7703DD = 1138
32212: 7E00FE0028083E02CD5E = 791
32222: 7ACD027BC1E5DDE5E111 = 1566
32232: 070019DD7504DD7405E1 = 941
32242: DD360600DD3607FF11EF = 1074
32252: 03DD1910BBDDE1E1D1C1 = 1525
32262: F1C9010C0D03010C1C01 = 513
32272: 00000000000000000000 = 0
32282: 00000000000000001051803 = 33
32292: 010A0B02010E1E040113 = 93
32302: 11010000000000000000 = 18
32312: 02050503010A1904010B = 67
32322: 1002010D1002010E1904 = 94
32332: 02122401010910020209 = 96
32342: 1904020E0903020E2003 = 108
32352: 02131401011315010207 = 93
32362: 0A0202071F04020C0301 = 74
32372: 020C260302110A020211 = 105
32382: 1F04C5D5E5DD7E00FE00 = 1275
32392: CA137F473AA87FCB2780 = 1142
32402: 47C5DD4E01DD4602DD7E = 1208
32412: 03ED43C67F32C57FCD96 = 1361
32422: 7ACD7B7AFE002836DD4E = 1219
32432: 01DD4602DD7E03CD097D = 983
32442: DD7703CD967ACD7B7AFE = 1524
32452: 00281DDD4E01DD4602DD = 883
32462: 7E03CDAF7ADD7703CD96 = 1329
32472: 7ACD7B7AFE002804C137 = 1118
32482: 1831DD7101DD7002DD7E = 1090
32492: 0332C47F2606CDC1703E = 992
32502: 02CD5E7ACD027BDD6E04 = 1088
32512: DD6605DD7E03772336FF = 1141
32522: DD7504DD7405C1108037 = 1076
32532: 3FE1D1C1C9E5C5DD6E04 = 1652
32542: DD6605DD4E01DD46022B = 964
32552: 3E00CD5E7ACD027B7EFE = 1193
32562: 002808CDAF7ACD967A18 = 1051
32572: EADD360000C1E1C9C5D5 = 1538
32582: DD2100840E000606CD80 = 745
32592: 7E301BC5DD7E00FE0120 = 1032
32602: 09014B00CD3978C11807 = 691
32612: 015A00CD3978C1CD197F = 1023
32622: DD7E00FE0020010C11EF = 902
32632: 03DD1910D179FE062805 = 900
32642: D1C1373FC9D1C137C90C = 1391
```

HACKER

You've stumbled into an unknown computer system. Now what?



"Logon".
One word appears on your screen.
What do you do now?
You don't know the password. You don't even know what computer system you've hacked into. But you do know that you must find out more.
There are no instructions. No rules. No clues.
You're completely on your own.
You've found your way in. But is there a way out?

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PLOTMATE PLOTTING PEN

John Dawson takes a close look at the Plotmate and details a high level interpreter/compiler he's working on for the BBC.

LAST MONTH I looked at a range of peripherals for the BBC microcomputer. The Plotmate plotter was cheap, robust and clever, and it seemed worthwhile spending some more time with it so that I could tell you about it in greater detail. At the same time I'll start to describe a high level interpreter/compiler that I'm writing to work with any plotter that accepts commands as a series of ASCII characters.

The Plotmate plotter is comparatively cheap, especially when you keep in mind all that it can do. Basically, the hardware is a sturdy, mains powered single pen A4 flatbed plotter which interfaces to either the user or the printer ports of the BBC; but that is only part of the story.

The pen can be changed for one of a number of different colours and it is possible to use larger sheets of paper in the plotter (up to A2) by drawing one section of whatever it is you are plotting and then moving and realigning the paper. The pen holder and the cross arm on which the pen holder travels are both moved by toothed belts driven by a pair of solid looking stepper motors.

'The plotter is superb'

The resolution of the plotter is 0.1mm which is the same as the Epson HI-80. The massive construction of the Plotmate plotter pays off when a design requires the plotter to return to one point several times. While a plotter may have a high resolution, that's of very little use if it isn't repeatable.

Some of the recursive designs that I have produced using the Plotmate and the Acornsoft 'Creative Graphics' package cover the same line many times and the plotter is superb — after the sixth time, lines in the design were no thicker than a single line newly drawn.

The Plotmate plotter uses the BBC microcomputer to provide its "intelligence". Unlike the Epson HI-80 or the Tandy plotters which have at least one microprocessor inside the plotter, the Plotmate requires a driver program to be loaded into the BBC.

Figure 3.

```
.LIBA
MA 1000,750
AR 0,30,350,200,0,2
.GREEN
MA 1400,550
AR 1,30,350,200,0,2
.RED
.ITALIC
SI 40,30
MA 500,10
LA___ July 85
MA 1000,10
LAEQUIPMENT
MR 30,20
AR 0,30,350,150,0,2
.GREEN
MR 100,-20
LAPERSONNEL
MR 30,20
AR 1,30,350,150,0,2
```

The driver program is just over 9000 bytes (2400 hex bytes) long and is supplied in two versions. H.PLMATE is loaded into the Ram space normally used by the mode four screen memory. When you use this driver it is not possible to plot on to the screen and the plotter at the same time. L.PLTMATE sits below the mode 4 Ram and with this driver in place you can plot on the screen and the plotter simultaneously. This driver restricts the length of a Basic program quite severely.

The Plotmate software is very clever because it provides easy interfacing between the plotter and much, but not all, of the software that has been written to draw things on the screen of the BBC micro. You too could have had the same idea as it is all based on the warning on page 408 of the BBC micro User Guide:

> "If the user intercepts the Operating System Write Character routine (OSWRCH) then all the VDU control codes must be dealth with. When a Basic program executes DRAW 10,10 a string of 6 bytes is sent to the VDU driver via OSWRCH. In this case the bytes would be 25,5,10,0,10,0, so beware!"

Plotmate actually uses this feature of the BBC operating system to get its data by rerouting commands in the OSWRCH channel. Normally a character to be printed on the VDU will be printed as text or ignored by the Plotmate driver, but if a "special" code — one of the VDU drivers — is detected by Plotmate, the numbers following the code will be trapped and used to generate a graphic output to the plotter.

Figure 6 shows the character set available for the Plotmate. In addition to the standard ASCII

(continued on page 77)

Figure 1.

```
1960 DEF PROCMACRO
1970 K = INSTR(".ITALIC.GREEN.RED.BLUE.BLACK.HISTOGRAM.PIE
.TITLE.BLOCK.SIZE.INCX.INCY.INCZ.SETX.SETY.SETZ.REPEAT.UNTIL
.PLOT.EVALUATE..", A$(D%))
1980 IF K = 0 THEN PROC_ELEMENT
1990 IF K = 1 THEN PRINT "EM3": PRINT "SL95"
2000 IF K = 8 THEN PRINT "SP3"
2010 IF K = 14 THEN PRINT "SP4"
2020 IF K = 18 THEN PRINT "SP2"
2030 IF K = 23 THEN PRINT "SP1"
2040 IF K = 43 THEN PRINT "DIO": PRINT "SI80,60": PRINT "EM1":
PRINT "MA300,1800"
2050 IF K = 49 THEN PRINT "EMO": PRINT "SLO"
2060 IF K = 55 THEN PRINT "SI70,90"
2070 IF K = 117 THEN PRINT "L@"; RIGHT$(A$(D%),LEN(A$(D%)-2))
2080 ENDPROC
```

Figure 2.

```
1380 DEF PROCPLOT
1390 CLS
1400 FOR D% = 0 TO C%
1410 IFLEFT$(A$(D%),1)
  = "." THEN PROCMACRO
  ELSE PRINT A$(D%)
1420   NEXT D%
1430 PRINT "SP-1"
1440 VDU26
1450 CLS
1460 ENDPROC
```

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Figure 4.

```
3320 DEF PROCSPOOL_TEXT
3330 *DELETE Y.DEFAULT
3340 PROCRH_WINDOW
3350 *SPOOL Y.DEFAULT
3360 PROCPLOT
3370 *SPOOL
3380 ENDPROC
3390
3400 DEF PROC_ELEMENT
3410 F$ = ":"+Drive$+".
     T"+A$(D%)
3420 E = OPENUP(F$)
3430 REPEAT
3440   Char% = BGET£(E)
3450   Char$ = CHR$(Char%)
3460   PRINT Char$;
3470   UNTIL EOF£(E)
3480 CLOSE£ E
3490 ENDPROC
```

(continued from page 75)
alphanumerics there is a wide range of mathematical and Greek symbols which will be useful in many scientific and technical applications.

Figure 5 shows a few of the different block fill shades that can be set by altering the special VDU 23,255 command. This command is trapped like all the other VDU commands and is used to control the direction in which the text is printed, character size, density of shading, pattern of dotted lines, and so on.

Linear Graphics have tested a good number of graphics packages for the BBC and they can advise you — Linear Graphics Limited, 28 Purdeys Way, Rochford, Essex SS4 1NE — about interfacing and compatibility. Linear Graphics also offer a computer assisted design package, an electronic circuit diagram drawing program and a bar/pie chart program.

The design program, Lincad, is unusual in offering to draw isometric lines, which can be very useful. You may use a joystick or the cursor keys to move about the screen and Lincad will also zoom in up to 32 times, to permit you to place lines more accurately, draw dotted constructions lines, vary the size and slant of text on the diagram and keep labels for a diagram in a separate file. Generally the programs work satisfactorily and appear to be well error-proofed.

Sadly, I have to return the Plotmate plotter at the completion of this review. Many other plotters accept a relatively limited set of commands and I have been writing a high level interpreted plotter language to draw diagrams, flow charts and graphs more easily.

Wychwood is written in Basic and the instructions that the program will execute are held in an array. Each instruction is interpreted in turn as the program works through the array. An interpreter is a computer program where an instruction is read from the source code — an element in the array — and translated into a series of lower level instructions — the object code — by the interpreter.

String of ASCII characters

Those low level instructions can do anything you like; it just so happens that I want to control a plotter at present, but I can rewrite some small parts of the interpreter Basic program and use it to control a robot, or a weather station, or to draw a knitting pattern on the BBC screen.

So, the purpose of Wychwood is to escape from all the low level single instructions needed to control most ordinary plotters. For example, the Oric MCP-40 plotter (equivalent to the Tandy four colour plotter and others) will draw a line from the current pen position when this command is received by the dedicated microprocessor inside the plotter:

D 100,200

Many other plotters work on the same principle — a command is a string of ASCII characters terminated by a Return character. In particular, numbers are sent in simple text or string form rather than as binary coded decimal, BBC integer internal format or any other complicated, non-standard representation.

The Epson HI-80 is a sophisticated but fairly cheap, in commercial terms, plotter that will do marvellous things like writing text in circles, plotting filled circles and boxes when it is unleashed. In order to retain some compatibility with earlier designs, the Epson has a second mode of operation which provides a command set that is equivalent to the Watanabe (Graphtech Myplot II).

The second mode is only a pale shadow of the full Epson command range but still both are transmitted to the plotter as strings of ASCII characters.

There is some compatibility between the instructions of some plotters. Both the Tandy/Oric and the Watanabe plotters will rotate in 90 degree steps the direction in which text is

(continued on next page)

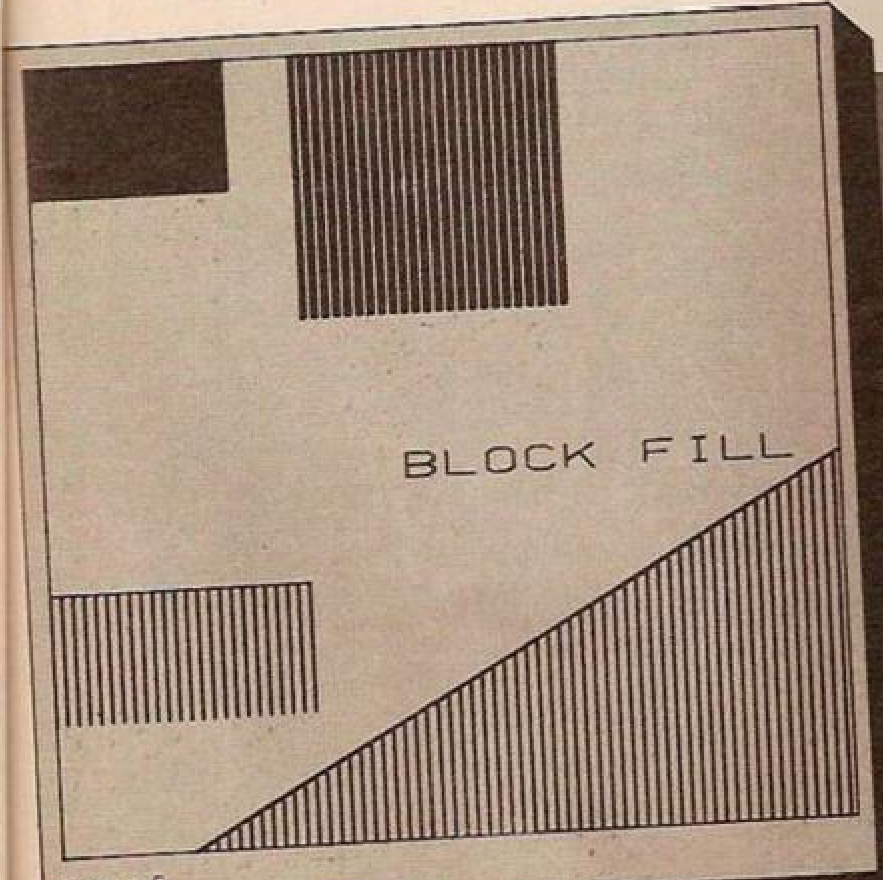


Figure 5.

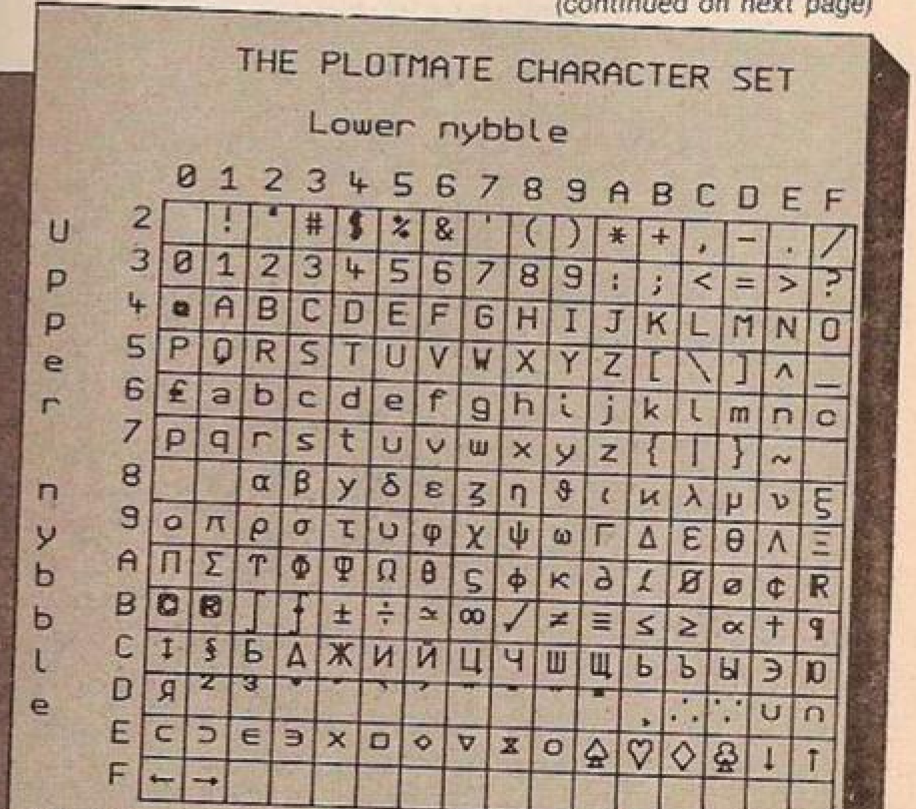


Figure 6.

(continued from previous page)

printed on to a design by the command:

Qn where n lies between 0 and 3

Other commands in all the instruction sets will take a series of numbers following the command identifier to indicate, for example, points through which a line should be drawn; the centre, radius and start and end points of a circle; and the length, subdivision and markings to be drawn on an X or Y axis.

The Wychwood program works well as a whole and has been used with an Epson HI-80 for a number of jobs. It is not necessarily complete and can be expanded as far as you need, or modified to suit your particular requirements. Wychwood does depend heavily on having one or more floppy disc drives attached to your micro although the fundamental ideas could be adapted quite easily to a cassette-based micro.

The only limitation on translating the program to other dialects of Basic is the need for an Instr — Instring — instruction or its equivalent.

Figure 1 is the listing of the key procedure — Procmacro, lines 1960 to 2080 — to its present state of completion.

The Instr command (line 1970) "searches one string for the occurrence of another string . . . the number returned is the . . . position of the second string in the first string" — BBC User Guide, page 280.

If, for example, A$(D%) contains the characters, .Red then K is set to 14 and a match will be detected by line 2010. Similarly, if an instruction in the Wychwood program is .Title then K is set to 43 and the interpreter will send the following instructions to the printer:

```
DI 0            Direction of text 0 degrees
SI 80,60        Text size 80 by 60
EM 1            Set emphasis to 1
MA 300,1800     Move absolute to 300,1800
```

I've added spaces to the list above to make it easier to follow. Procmacro is called by Procplot — lines 1380 to 1460 — which is shown in figure 2. You'll see that Procplot is very simple; it's a For . . . Next loop that starts at the beginning of the Wychwood program held in the A$ array and works its way through to the last instruction which is pointed to by C%.

High level instructions, or macros, are always identified by a "full stop" or period as the first character in the instruction. If the first character is anything else it is taken to be a single low level instruction that can be printed, that is transmitted, directly to the plotter. Line 1430 sends the Epson HI-80 specific code to park and cap the plotter pens to prevent them drying out.

Figure 3 is part of a Wychwood program. Note that there are both single instructions and high level commands interspersed throughout the listing.

The two letter codes at the start of many of the lines (MA AR SI LA MR) are specific to the Epson HI-80. Line 0 is more interesting as this instruction is not included in the plotter 'language', the commands included in the Basic program line 1970, but is instead a high level compiled instruction which may contain several hundred low level commands.

".Liba" is, in fact, a disc file containing instructions in text form which can be edited using View or any other BBC wordprocessor. '.Liba' was written, tested and edited as an array using the Wychwood facilities.

Wychwood is both an interpreter and a compiler. If an element of a design is contructed using relative draw and move commands, that is 'move relative' to the current pen position rather than 'move to an absolute location', it becomes possible to use the same compiled element repeatedly, preceded by low level commands to place it in the right position and set the scale at which it should be drawn. ■

CONCLUSIONS

- However high a density you set on a dot matrix printer, the output from a screen dump is never made up of clean, straight lines. I think that pen drawing is still essential for high quality artwork that is to be reproduced. Many of the graphics programs available for the BBC microcomputer include Epson compatible screen dump routines because plotters have been comparatively expensive until recently and because most people cannot afford a printer and a plotter. The Plotmate offers an excellent way round the problem of a lack of graphics software that will interface with the Epson HI-80, for example.
- If you have access to a Tandy four colour plotter, the Epson HI-80, or any other plotter that accepts commands as ASCII characters, Wychwood is the start of a high level plotter language. I'll describe the whole program next month with more emphasis on the disc routines and the editor.


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MIDNIGH

Reg Fry chugs along on a CBM-64.

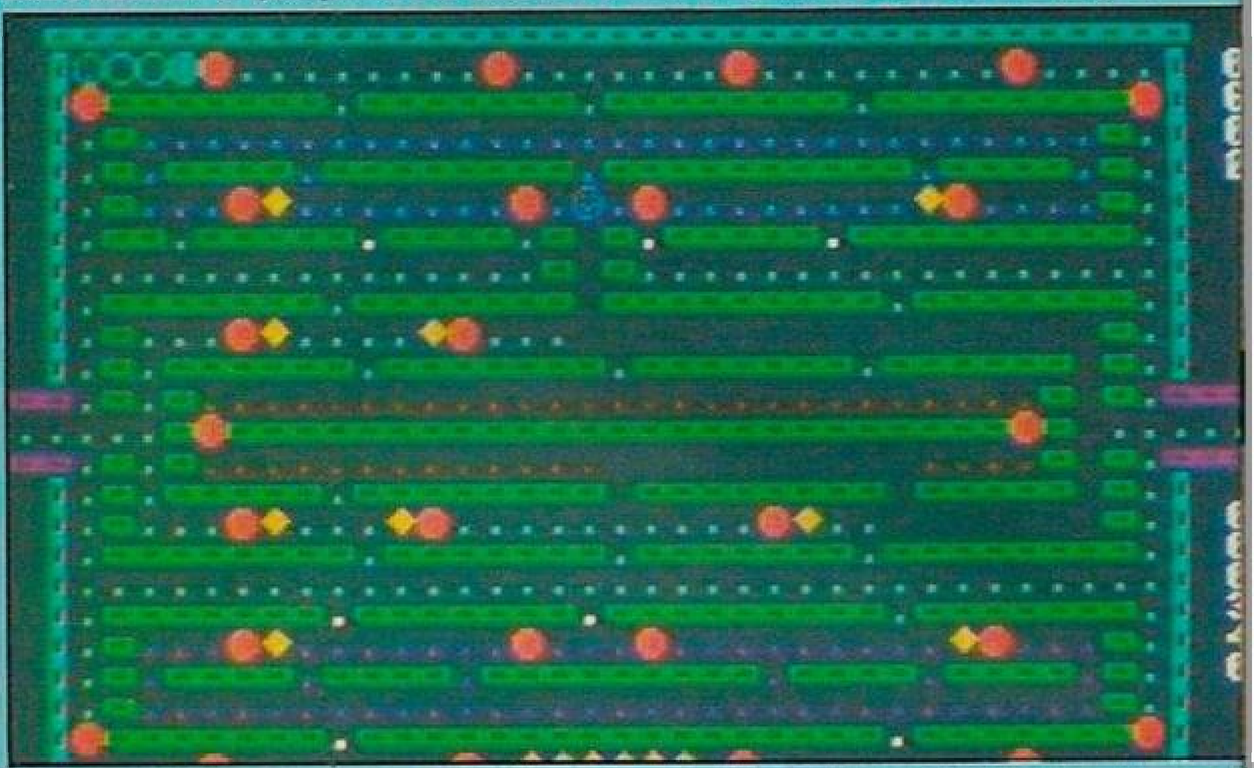
THIS GAME simulates a train running round a maze and, although the same basic screen pattern is used for all sectors, there are three different types of play. Whilst the screen display is written in Basic, all the action routines are in machine code.

The game runs for a maximum of six sectors, three in daylight and three at night. You can choose to play the three day or three night sectors separately — or all six in sequence. There are seven playing speeds available and if you are using a joystick it must be fitted to port 2.

Sector 1: The train starts with an engine and three carriages which are running round the track. Your man is the circular face at the middle; his movement is controlled by the joystick. As you guide your man round the track he picks up all the letters, parcels and packages that have been dropped, for which you get bonus points.

If you enter the purple exits at either side, your man will be converted into a carriage — you can then run after the train and if you are careful you can add the carriage onto the end of the train. The bonus you get for doing this varies with time from a maximum of 1,000-points. The value of this bonus is shown by the figures at the top right hand of the screen.

Take care you stop as soon as you add a carriage to the train — or the game will end! The game will also end if you run into any other part of the train. If the train hits one of its own carriages, or runs into you, the sector ends and the game



Listing 1.

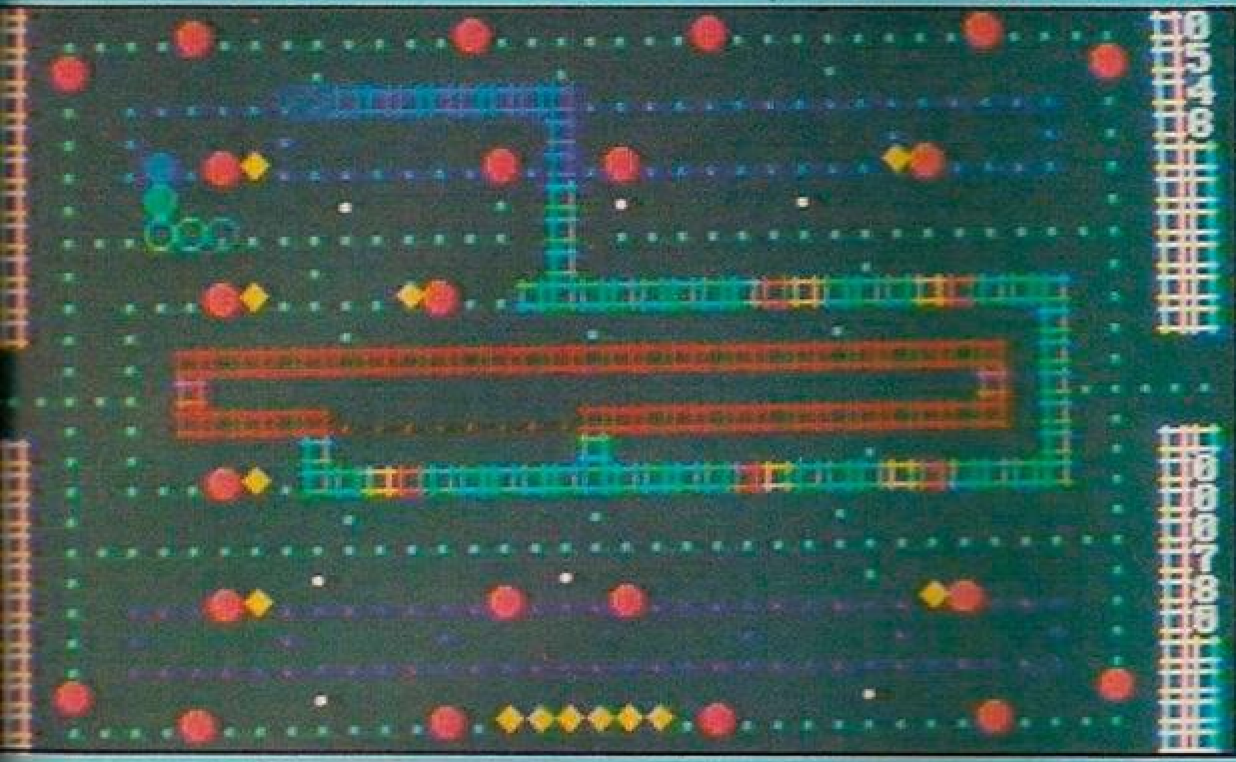
```
10 C=C+1 IFC=1THENLOAD"",1,1
20 POKE780,141
30 FORL=54272TO54296:POKEL,0:NEXT:POKE54296,15:GOSUB1640:..RY .. MH 1985
40 POKE52,56:POKE56,56:CLR:POKE56334,PEEK(56334)AND254:POKE1,PEEK(1)AND251
50 SYS50704
60 POKE1,PEEK(1)OR4
70 POKE56334,PEEK(56334)OR1
80 H1=48:H2=48:H3=48:H4=48:H5=48:H6=48
90 GOSUB1020:FORG=1TO20:PRINT:NEXT
100 PRINTCHR$(14)"RITTEN BY..RY .. MH 1985"
110 PRINT"TAB(9)"LEASE SELECT"
120 PRINTTAB(9)"LOW........"
130 PRINTTAB(9)"UICK.......EDIUM......"
140 PRINTTAB(9)"IGHTNING...AST......."
150 PRINTTAB(9)"IDICULOUS..MPOSSIBLE.."
160 GETS$
170 IFS$="S"THENFP=40:FS=60:SP=40:SS=60:SD=45:GOTO260
180 IFS$="M"THENFP=30:FS=50:SP=30:SS=50:SD=40:GOTO260
190 IFS$="Q"THENFP=30:FS=45:SP=30:SS=45:SD=40:GOTO260
200 IFS$="F"THENFP=30:FS=40:SP=30:SS=45:SD=35:GOTO260
210 IFS$="L"THENFP=26:FS=34:SP=30:SS=40:SD=35:GOTO260
220 IFS$="I"THENFP=26:FS=34:SP=26:SS=34:SD=32:GOTO260
230 IFS$="R"THENFP=25:FS=34:SP=26:SS=34:SD=28:GOTO260
240 IFS$="B"THENFP=2:FS=25:SP=25:SS=25:SD=15:GOTO260
250 GOTO160
260 POKE51740,FP:POKE51741,FS:POKE51742,SP:POKE51743,SS:POKE51744,SD
270 PRINT"LEASE SELECT"
280 PRINTTAB(16)"AY....."
290 PRINTTAB(16)"OTH...." PRINTTAB(16)"IGHT..."
300 TH=0:POKE51719,0
310 GETM$
320 IFM$="D"THENGOSUB470:GOTO580
330 IFM$="B"THENGOSUB470:GOTO580
340 IFM$="N"THENGOSUB360:GOTO580
350 GOTO310
360 REM NIGHT
370 I=14592:POKEI,66:POKEI+1,255:POKEI+2,66:POKEI+3,66
380 POKEI+4,66:POKEI+5,66:POKEI+6,255:POKEI+7,66
390 I=14856:POKEI,60:POKEI+1,126:POKEI+2,255:POKEI+3,255:POKEI+4,255
400 POKEI+5,255:POKEI+6,126:POKEI+7,60
410 I=15152:POKEI,0:POKEI+1,0:POKEI+2,0:POKEI+7,0
420 POKEI+4,0:POKEI+5,0:POKEI+6,0:POKEI+7,0
430 I=15144:POKEI,0:POKEI+1,0:POKEI+2,0:POKEI+3,0
440 POKEI+4,0:POKEI+5,0:POKEI+6,0:POKEI+7,0
450 SYS52016
460 RETURN
470 REM DAY
480 I=14856:POKEI,60:POKEI+1,126:POKEI+2,255:POKEI+3,255:POKEI+4,255
490 POKEI+5,255:POKEI+6,126:POKEI+7,60
500 I=15152:POKEI,0:POKEI+1,0:POKEI+2,255:POKEI+3,195
510 POKEI+4,195:POKEI+5,255:POKEI+6,0:POKEI+7,0
520 I=15144:POKEI,60:POKEI+1,60:POKEI+2,36:POKEI+3,36
530 POKEI+4,36:POKEI+5,36:POKEI+6,60:POKEI+7,60
540 I=14592:POKEI,0:POKEI+1,0:POKEI+2,0:POKEI+3,0
550 POKEI+4,0:POKEI+5,0:POKEI+6,0:POKEI+7,0
560 SYS52016
570 RETURN
580 POKE53280,11:POKE53281,11:PRINT"J":POKE53272,30
590 PRINT"[illegible]"
600 PRINT"[illegible]"
610 PRINT"[illegible]"
620 PRINT"[illegible]"
630 PRINT"[illegible]"
640 PRINT"[illegible]"
650 PRINT"[illegible]"
660 PRINT"[illegible]"
670 PRINT"[illegible]"
680 PRINT"[illegible]"
690 PRINT"[illegible]"
700 PRINT"[illegible]"
710 PRINT"[illegible]"
720 PRINT"[illegible]"
730 PRINT"[illegible]"
740 PRINT"[illegible]"
750 PRINT"[illegible]"
760 PRINT"[illegible]"
770 PRINT"[illegible]"
780 PRINT"[illegible]"
790 PRINT"[illegible]"
800 PRINT"[illegible]"
810 PRINT"[illegible]"
820 PRINT"[illegible]"
830 PRINT"[illegible]"
840 REM FOR I=1024 TO 2023:SCR=PEEK(I):POKE(I+29952),SCR:DOE BY SYS50432
850 SYS50432
860 HD=1963:P=INT(HD/256):POKE254,P:POKE253,HD-P*256
870 TL=1966:FORI=HD+1TOTL:POKEI,88:NEXTI:POKEHD,65
880 R=INT(TL/256):POKE252,R:POKE251,TL-R*256
890 FORI=1663TO1863STEP40:POKEI,48:POKEI+54272,1:NEXTI
1000 S7=49:S8=48:S9=48:S0=48:SZ=1:POKE51738,1
1010 FORI=51730TO51732:POKEI,48:NEXT:POKE51729,49
1020 FORI=1103TO1223STEP40:POKEI,48:POKEI+54272,1:NEXTI:POKE1103,49
1030 FORI=1663TO1863STEP40:POKEI,48:POKEI+54272,1:NEXTI
1040 POKE54278,0:POKE54277,144:POKE54273,100
1050 SYS50944
1060 IFPEEK(51717)=1THEN1140
1070 IFPEEK(51720)=1THEN1090
1080 GOTO1050
1090 REM HIT TR
1100 GOSUB1790:GOSUB540
1110 POKE53280,2:POKE53281,2:POKE53272,21
1120 PRINTCHR$(14)"ARD LUCK YOU HAVE HIT THE TRAIN"
1130 GOTO1430:END
1140 SYS50480:ND=PEEK(51739):GOSUB540
1150 GOSUB1790:POKE53280,2:POKE53281,2:POKE53272,21
1160 PRINTCHR$(14)"OUR BONUS FOR CLEARING"
1170 IFND=0THEN POKE51725,(5+PEEK(51725)):BO=5000:GOTO1240
1180 IFND=1THEN POKE51725,(4+PEEK(51725)):BO=5000:GOTO1240
1190 IFND=2THEN POKE51725,(3+PEEK(51725)):BO=4000:GOTO1240
1200 IFND=3THEN POKE51725,(1+PEEK(51725)):BO=3000:GOTO1240
1210 IFND<10THEN POKE51726,(5+PEEK(51726)):BO=1000:GOTO1240
1220 IF ND <20THEN POKE51726,(2+PEEK(51726)):BO=500:GOTO1240
1230 PRINT"TOO":PRINT"EW PACKAGES IS 0 POINTS":GOTO1260
1240 PRINT" ALL"
1250 PRINT"UT" ND "PACKAGES IS"BO"POINTS":SYS49920
1260 GOSUB2310:POKE53280,11:POKE53281,11:PRINT"J"CHR$(142):POKE53272,30
1270 IFTH=1ORTH=2THENSYS50000
1280 TH=TH+1:R=PEEK(51719):POKE51719,R+1
1290 IFTH=2THEN1380
1300 S7=49:S8=48:S9=48:S0=48
1310 POKE51729,48:POKE51730,48:POKE51731,48:POKE51732,48
1320 POKE1663,PEEK(51723):POKE1703,PEEK(51724):POKE1743,PEEK(51725)
1330 POKE1783,PEEK(51726):POKE1823,PEEK(51727):POKE1863,PEEK(51727)
1340 FORI=55375TO55495STEP40:POKEI,1:NEXT
1350 FORI=55935TO56135STEP40:POKEI,1:NEXT
```

T EXPRESS

moves to the next sector.

To help get a high score on this sector you must therefore collect carriages and add them to the train as quickly as possible. When you have added 11 or more carriages to the train it will eventually crash into itself and the sector is ended. You get an additional bonus if you clear all the letters, etc, from the track. The value of this bonus is 5,000 points for clearing every item, reducing to zero if you leave more than 20 items behind.

Sector 2: In this sector railway staff are trying to stop the service by continually adding carriages to the train as it runs along — sometimes it will crash into itself very quickly so you need to act fast! Your job is to run after the train and pick up the additional carriages keeping the length of the train down to a few carriages so it does not crash into itself. You can touch any carriage — but, if you hit the engine the game will end.



You still get bonus points for picking up all the items on the track, and the same bonus for having cleared all or most items at the end of the sector. You can take a chance and leave the end of the train at any time to pick up the odd items left behind. You also get a time bonus in this sector which is again shown at the top right hand of the screen. This increases to a maximum of 3,000 points. It is difficult to get 3,000 in this sector — but you need to watch out — because if the bonus goes over 3,000 points it starts again at zero!

Sector 3: In this final sector a saboteur has set the train controls at full speed and jumped out — it just tears away and you have no chance of catching it. Your task is to pick up all the letters and parcels, etc, without being run over — not an easy task — and you will get many a fright! You are safe from the train in the purple exits and in two other spots close by — so you can take a rest if you need it. You get the same sets of bonus points as in the previous sector — both for clearing the tracks and for time.

The movement of the train in this sector is controlled by the pseudo random generator. This means that the train cannot sense where you are but just leaps around of its own accord. But beware because it will pounce on you as quick as a flash if you happen to get in its path.

If you can work out the character set for the

(continued on next page)

```
1360 IFM$="N"THENGOSUB360
1370 GOTO590
1380 IFM$="D"ORM$="N"THEN1400
1390 IFM$="E"THENM$="N":TA=3:POKE51719,0:GOSUB360:GOTO500
1400 FORI=1TO100:NEXT
1410 GOSUB1790:POKE53280,2:POKE53281,2:POKE53272,21
1420 PRINTCHR$(14)"[illegible]HARD LUCK YOU HAVE BEEN CAUGHT UP"
1430 PRINT"[illegible]YOUR SCORE="
1440 S1=PEEK(51723):S2=PEEK(51724):S3=PEEK(51725):S4=PEEK(51726)
1450 S5=PEEK(51727):S6=PEEK(51728)
1460 POKE1401,S1:POKE1402,S2:POKE1403,S3:POKE1404,S4:POKE1405,S5:POKE1406,S6
1470 FORI=55672TO55679:POKEI,1:NEXT
1480 IFS1>H1THENH1=S1:H2=S2:H3=S3:H4=S4:H5=S5:H6=S6:GOTO1570
1490 IFS1<H1THEN1570
1500 IFS2>H2THENH2=S2:H3=S3:H4=S4:H5=S5:H6=S6:GOTO1570
1510 IFS2<H2THEN1570
1520 IFS3>H3THENH3=S3:H4=S4:H5=S5:H6=S6:GOTO1570
1530 IFS3<H3THEN1570
1540 IFS4>H4THENH4=S4:H5=S5:H6=S6:GOTO1570
1550 IFS4<H4THEN1570
1560 IFS5>H5THENH5=S5:H6=S6
1570 PRINT"[illegible]HI SCORE="
1580 POKE1481,H1:POKE1482,H2:POKE1483,H3:POKE1484,H4
1590 POKE1485,H5:POKE1486,H6
1600 FORI=55752TO55758:POKEI,1:NEXT
1610 PRINT"[illegible]PRESS SPACE BAR TO TRY AGAIN"
1620 IFPEEK(197)<>60THEN1620
1630 PRINTCHR$(142):GOSUB1640:GOTO90
1640 POKE53280,2:POKE53281,2:PRINT"[illegible]  THIS IS THE GAME OF MIDNIGHT EXPRESS"
1650 PRINT"[illegible]  THE OBJECT OF THE GAME IS TO PREVENT"
1660 PRINT"YOUR MAN FROM BEING HIT BY THE TRAIN,"
1670 PRINT"AND AT THE SAME TIME TO SCORE AS MANY"
1680 PRINT"POINTS AS YOU CAN BY PICKING UP ALL THE"
1690 PRINT"LETTERS, PARCELS AND PACKAGES. THERE ARE"
1700 PRINT"MANY WAYS OF SCORING BONUS POINTS."
1710 PRINT"[illegible]  SCORING [illegible]    POINTS"
1720 PRINTTAB(13)"LETTERS  ([illegible])....[illegible] POINTS"
1730 PRINTTAB(13)"PARCELS  ([illegible])....[illegible] POINTS"
1740 PRINTTAB(13)"PACKAGES ([illegible])....[illegible] POINTS"
1750 PRINT"ADD A CARRIAGE TO TRAIN 1000 POINTS MAX"
1760 PRINT"[illegible]  IN OTHER SECTORS THE LONGER YOU LIVE"
1770 PRINT"      THE HIGHER THE BONUS YOU GET":RETURN
1780 PRINTTAB(12)"PLEASE WAIT.....":POKE54273,0:POKEW1,129
1790 POKE54277,11:POKEW1,128:FORG=60TO1STEP-2:POKE54273,255
1800 POKE53280,G+9:POKE53281,G+9:NEXT:FORG=1TO1000:NEXT
1810 POKE54277,144:RETURN
1820 PRINT"[illegible]PRESS SPACE BAR TO BEGIN";
1830 FORL=54272TO54295:POKEL,0:NEXT
1840 W1=54276:W2=54283:W3=54290:POKE54277,144:POKE54284,73:POKE54291,72
1850 IFPEEK(197)=60THENRESTORE:POKE198,0:RETURN
1860 POKEW1,32:POKEW2,32:POKEW3,32:POKEW1,33:POKEW2,33:POKEW2,33
1870 READA,B,C,D,E,F,G
1880 IFG=-1THEN RESTORE:FORL=1TO1000:IFPEEK(197)<>60 THEN NEXT
1890 IFG=-1THEN1850
1900 POKE54273,A:POKE54272,B:POKE54280,C:POKE54279,D:POKE54287,E:POKE54286,F
1910 FORL=1TOG-15:NEXT:GOTO1850
1920 DATA,,,,,76,252,,,4,208,400,72,169,,,7,53,400,64,188,,,4,208,400
1930 DATA57,172,,,7,53,400,51,97,,,4,208,400,48,127,,,7,53,400
1940 DATA43,52,,,4,208,400,38,126,,,7,53,400,76,252,,,4,208,160
1950 DATA72,169,,,7,53,160,64,188,,,4,208,160,57,172,,,7,53,160,51,97,,,4,208
1960 DATA160,48,127,,,7,53,160,43,52,,,4,208,160,38,126,,,7,53,160
1970 DATA76,252,,,4,208,160,72,169,,,7,53,160,64,188,,,4,208,160
1980 DATA57,172,,,7,53,160,51,97,,,4,208,160,48,127,,,7,53,160
1990 DATA43,52,,,4,208,160,38,126,,,7,53,160
2000 DATA38,126,,,4,208,160,43,52,,,7,53,160,48,127,,,4,208,160
2010 DATA51,97,,,7,53,160,57,172,,,4,208,160,64,188,,,7,53,160
2020 DATA72,169,,,4,208,160,76,252,64,188,6,108,160,64,188,51,97,5,103,160
2030 DATA72,169,57,172,6,16,160,57,172,48,127,4,208,160,64,188,51,97,5,103,160
2040 DATA51,97,43,52,4,139,160,57,172,48,127,4,208,160,48,127,38,126,3,155,160
2050 DATA51,97,43,52,6,108,160,43,52,36,85,5,103,160,48,127,38,126,6,16,160
2060 DATA38,126,28,214,4,208,160,43,52,36,85,5,103,160,57,172,36,85,7,53,160
2070 DATA38,126,24,62,4,208,160,,,,2,104,160
2080 DATA76,252,64,188,6,108,160,64,188,51,97,5,103,160,64,188,51,97,5,103,160
2090 DATA72,169,57,172,6,16,160,57,172,48,127,4,208,160,48,127,38,126,3,155,160
2100 DATA51,97,43,52,4,139,160,57,172,48,127,4,208,160,48,127,38,126,6,16,160
2110 DATA51,97,43,52,6,108,160,43,52,36,85,5,103,160,48,127,38,126,9,21,160
2120 DATA38,126,28,214,4,208,160,43,52,36,85,5,103,160,72,169,57,172,9,21,160
2130 DATA76,252,48,127,9,159,160,,,,2,104,160
2140 DATA86,105,72,169,6,108,160,76,252,64,188,5,103,160
2150 DATA72,169,57,172,6,16,160,64,188,51,97,4,208,160,57,172,48,127,5,103,160
2160 DATA51,97,43,52,4,139,160,48,127,38,126,4,208,160,38,126,28,214,3,155,160
2170 DATA86,105,72,169,6,108,160,76,252,64,188,5,103,160
2180 DATA72,169,57,172,6,16,160,64,188,51,97,4,208,160,57,172,48,127,5,103,160
2190 DATA102,194,86,105,5,103,160,96,254,76,252,4,208,160,,,,2,104,160
2200 DATA86,105,72,169,6,108,160,76,252,64,188,5,103,160
2210 DATA72,169,57,172,6,16,160,64,188,51,97,4,208,160,57,172,48,127,5,103,160
2220 DATA51,97,43,52,4,139,160,48,127,38,126,4,208,160,38,126,28,214,3,155,160
2230 DATA86,105,72,169,6,108,160,76,252,64,188,5,103,160,57,172,48,127,5,103,160
2240 DATA72,169,57,172,6,16,160,64,188,51,97,4,208,160,,,,2,104,160
2250 DATA86,105,72,169,6,108,160,76,252,48,127,6,16,160,38,126,9,159,2,104,160
2260 DATA61,126,6,108,2,104,160,51,97,7,163,3,54,160,51,97,7,163,3,54,160
2270 DATA51,97,7,163,3,54,160,61,126,6,108,2,104,160,51,97,7,163,3,54,160
2280 DATA38,126,9,159,2,104,160,51,97,7,163,3,54,160,34,75,8,147,2,37,160
2290 DATA57,172,5,185,2,37,160,45,198,7,53,2,220,160,45,198,7,53,2,220,160
2300 DATA45,198,7,53,2,220,160,57,172,5,185,2,37,160,45,198,7,53,2,220,160
2310 DATA34,75,8,147,2,37,160,45,198,7,53,2,220,160,38,126,9,159,2,104,160
2320 DATA61,126,6,108,2,104,160,51,97,7,163,3,54,160,51,97,7,163,3,54,160
2330 DATA51,97,7,163,3,54,160,61,126,6,108,2,104,160
2340 DATA38,126,9,159,2,104,160,51,97,7,163,3,54,160,57,172,6,108,2,220,160
2350 DATA57,172,5,185,2,220,160,68,149,4,73,2,37,160,57,172,5,185,2,220,160
2360 DATA51,97,4,73,2,37,160,45,198,5,185,2,220,450,22,227,38,214,5,185,160
2370 DATA,,,2,104,160,51,97,7,163,3,54,160,38,126,9,159,2,104,160
2380 DATA61,126,6,108,2,104,160,51,97,7,163,3,54,160
2390 DATA51,97,7,163,3,54,160,51,97,7,163,3,54,160,34,75,8,147,2,37,160
2400 DATA38,126,9,159,2,104,160,45,198,7,53,2,220,160,45,198,7,53,2,220,160
2410 DATA57,172,5,185,2,37,160,57,172,5,185,2,37,160,45,198,7,53,2,220,160
2420 DATA45,198,7,53,2,220,160,45,198,7,53,2,220,160
2430 DATA34,75,8,147,2,37,160,45,198,7,53,2,220,160,38,126,9,159,2,104,160
2440 DATA61,126,6,108,2,104,160,51,97,7,163,3,54,160,51,97,7,163,3,54,160
2450 DATA51,97,7,163,3,54,160,61,126,6,108,2,104,160,51,97,7,163,3,54,160
2460 DATA38,126,9,159,2,220,160,68,149,4,73,[illegible],160,57,172,6,108,2,220,160
2470 DATA57,172,5,185,2,220,160,45,198,5,185,2,220,450,71,140,57,172,11,114,100
2480 DATA51,97,4,73,2,37,160,45,198,5,185,2,220,[illegible]
2490 DATA,,,,,,
2500 DATA-1,-1,-1,-1,-1,-1,-1
2510 [illegible]
2520 [illegible]
2530 PRINT"[illegible]"
2540 PRINT"[illegible]"
2550 [illegible]
2560 [illegible]
2570 POKE54273,0:POKE54277,144:RETURN
2580 END
```

(continued from previous page)

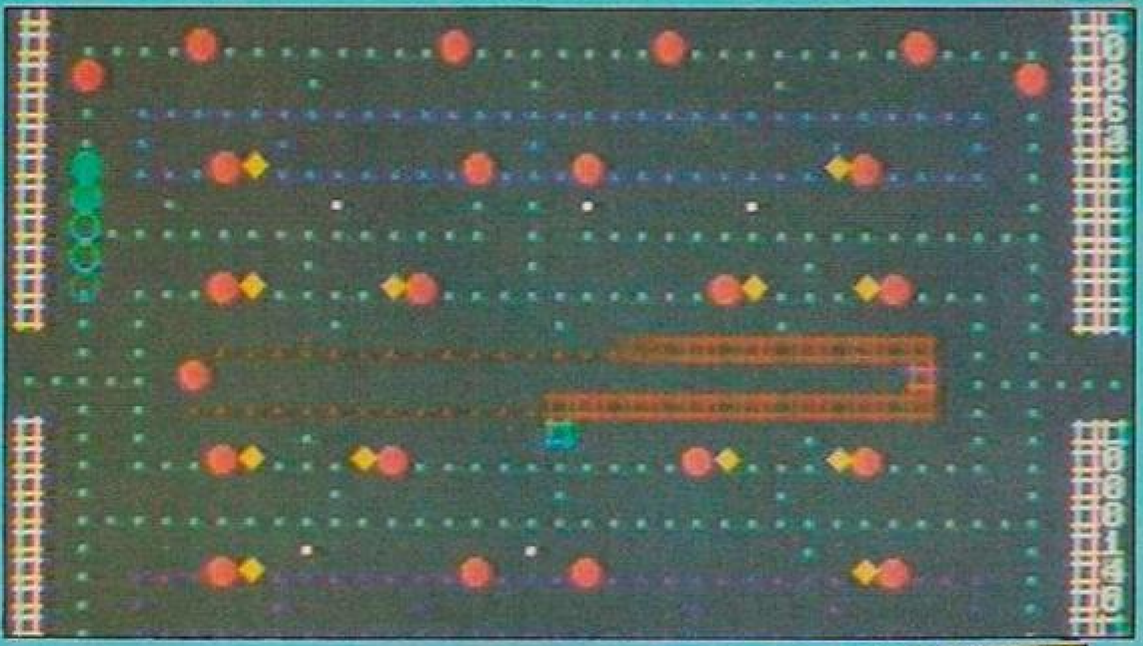
screen, you can try out your own designs by replacing the appropriate lines in the Basic section of the program, but you cannot change the starting location of the man or the train.

The game is available from Telsoft and also on tape from Camilla Software for £2.75, including postage and packing, at 4 Marennes Crescent, Brightlingsea, Colchester CO7 0RX.

To enter the program first type in and save listing 1. Now type in listing 2. This creates the game's machine-code routines and is not itself loaded when the game is played, but it is as well to save it anyway on another tape. When you have run listing 2 save the machine code routines after listing 1 on your tape with the command:

SYS52470,49152,53100,"MEXP2",1 or, ,8 for disc

To play the game, simply load listing 1 and Run it. ■

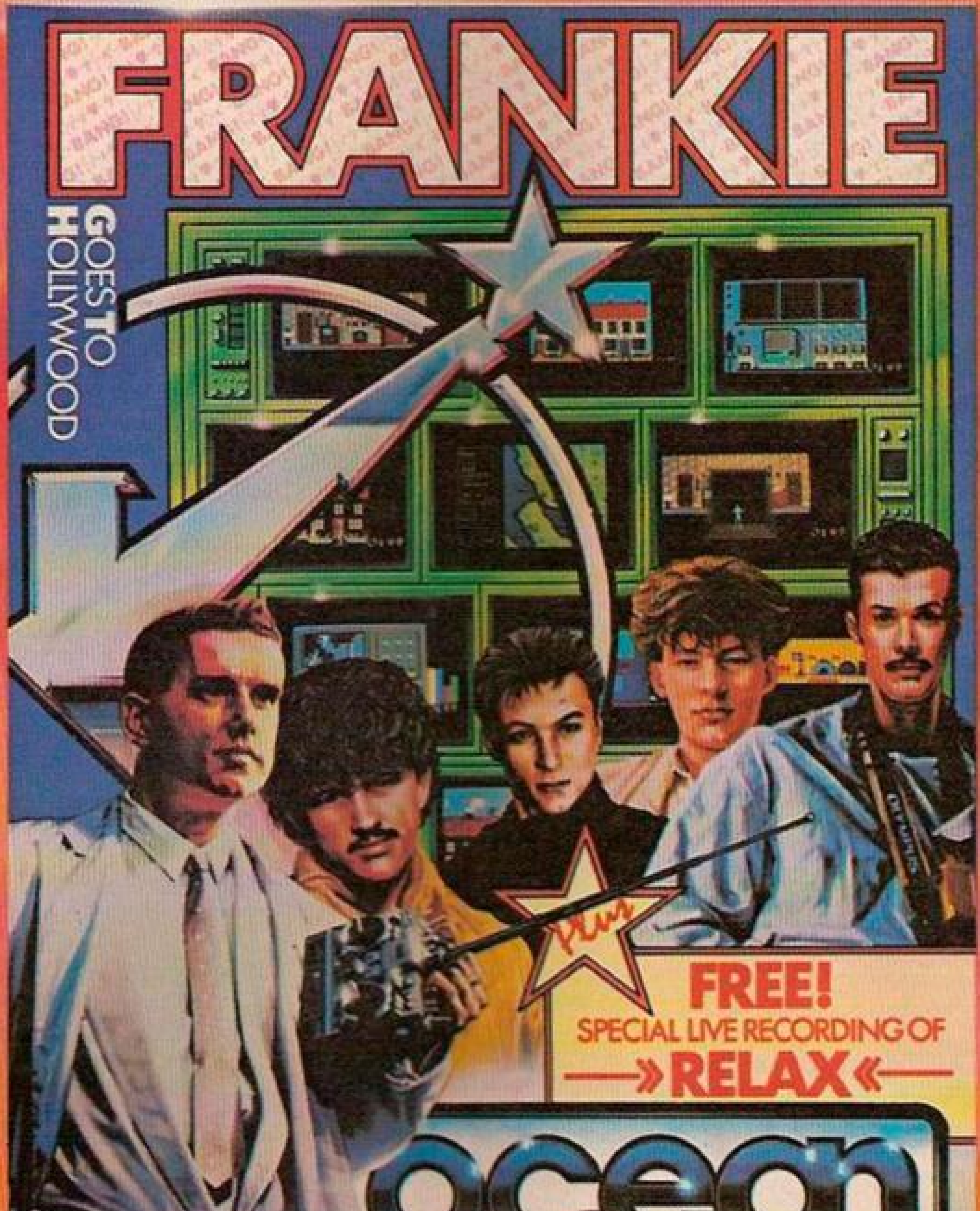


Listing 2.

```
10 PRINT"PLEASE WAIT "
20 Z=48 X=1 C=9 V=7 B=16 N=130 P=49152
30 REM...
40 PRINT...
50 FOR...
55 FOR...
60 ...
65 GOSUB90 ...
70 IF ... THEN ... GOTO 30
75 PRINT"DATA ERROR IN LINE"PEEK(63)+256*PEEK(64)
80 END
90 ... RETURN
95 ...
100 DATA [illegible]
```

[illegible]

TAKE A TRIP INTO THE PLEASUREGAME



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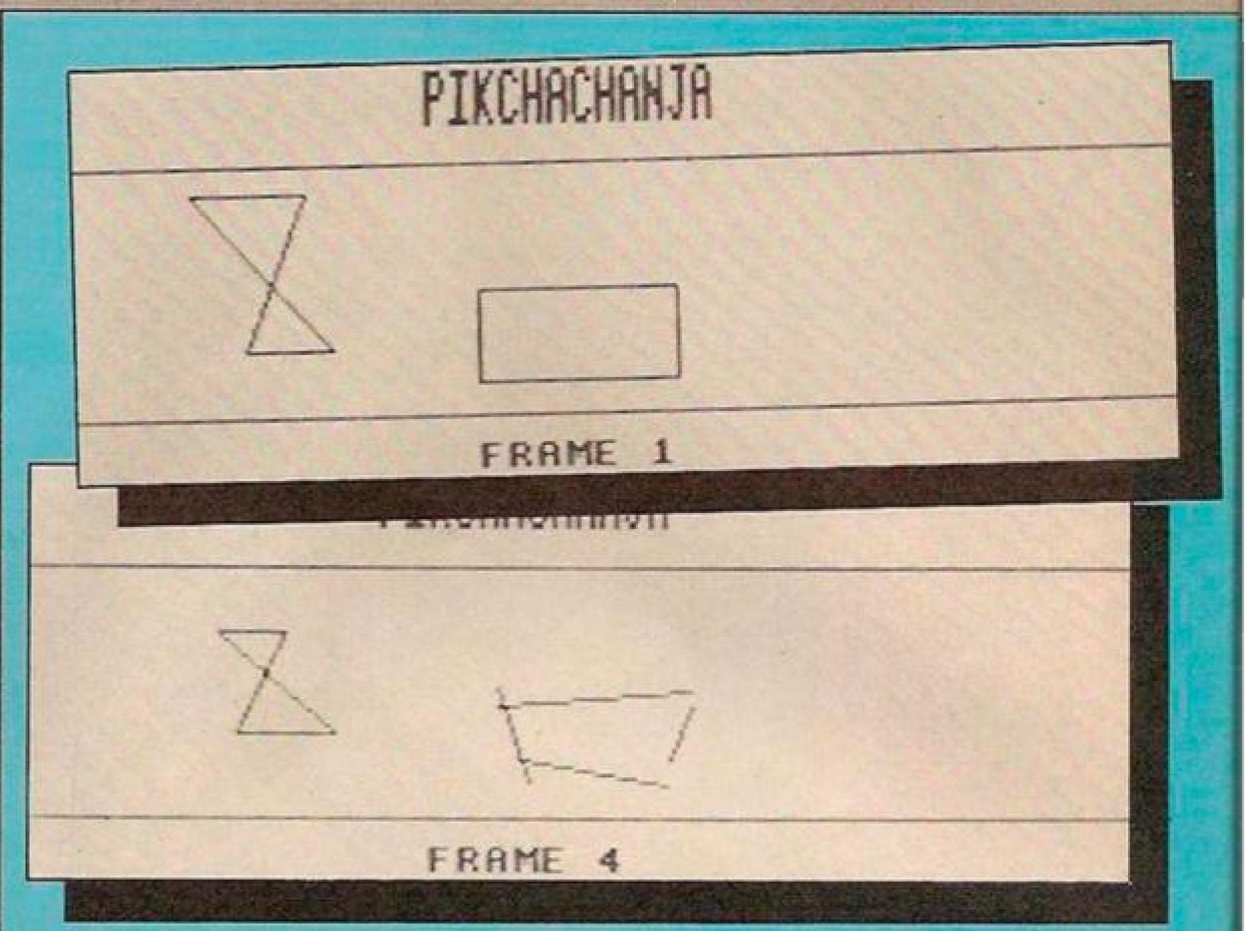
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Ocean Software is available from: Boots, WHSMITH, John Menzies, WOOLWORTH, LASKYS, Rumbelows, Greens, Spectrum Shops and all good software dealers.

Simon Woolf with an excellent animation program for the BBC.

PIKCHA



IF YOU have ever wanted to try your hand at making cartoons, Pikchachanja can give you taste of it. In effect it is an instant animation kit. You simply draw two "key" frames, each with the same number of lines. The program works out the frames in between and stores them in memory. Then by rapidly displaying each in turn it creates a smooth 18-frame animation sequence, which cycles backwards and forwards until you press a key.

The program was inspired by Timothy Closs's Pikchachanja for the Spectrum which was published in *Your Computer* last April. In the same issue Nalin Sharma converted the program to run on the CBM-64. Translating it to the BBC, however, was more difficult.

For each frame both the earlier versions simply stored the relevant section of the screen in memory and then read it back during animation. But on the BBC there is not enough Ram to store 18 frames in this way. So this program has to compact the screen information.

The technique used is to store the bytes that represent pixels and to keep a count of zero bytes which represent spaces. Naturally, displaying a compact screen takes longer than reading in a continuous block of memory. But it is still fast enough to display 18 frames in less than a second.

Even after compacting the screen, memory limitations remain a problem. Only 768 bytes are available to store each frame. This means that it is not possible to fill much more than a fifth of the screen with pixels. Consequently, the program has to check that your picture does not exceed the limit.

When you draw your key frames it sounds a warning beep as you approach the limit. You must then make sure that your remaining lines are as short as possible. If you run out of memory the program asks you to enter the frame again.

Entering frames is one of the four options available from the opening menu. The others are for saving and loading picture data, and animating a completed picture sequence.

When you enter a frame there are two drawing modes. In one, you have to plot the points at each end of a line; in the other, plotting a point — by pressing Return — joins it up to the last point on the previous line. You can switch between the two modes at any time. The drawing controls are as follows:

Z — cursor right
X — cursor left
: — cursor up
/ — cursor down
I — toggle cursor jump between four and 32 points
D — toggle between the two drawing modes
F — finish frame
Return — finish line

Note that in Mode 4 a jump of four co-ordinate points is equal to one pixel.

After you have completed the opening frame the screen will clear, and you can enter the final

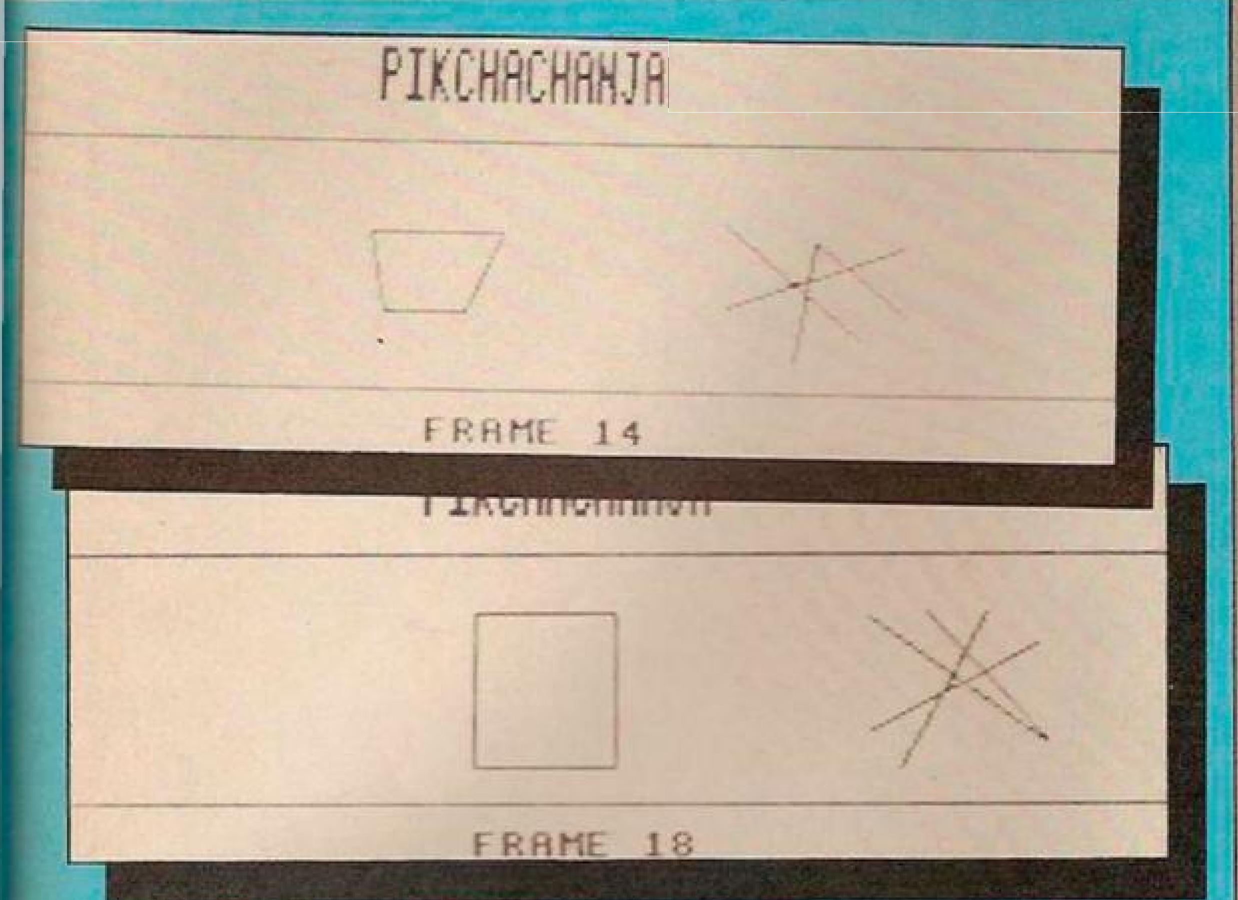
Listing 1.

```
10 REM ** Listing 1 **
20 *LOAD "MPIC" 1200
30 PAGE=&1400
40 CHAIN ""
```

Listing 2.

```
 10 REM ** LISTING 2 **
 20SCL=&72:SCH=&73
 30frmstlow=&74:frmsthigh=&75
 40?frmstlow=0:?frmsthigh=&22
 50templow=&76:temphigh=&77
 60bcount=&78
 70FORN=0TO3STEP3
 80P%=&1200
 90[OPT N
100 .display
110LDA#255:STA SCL:LDA#&61:STA SCH
120 LDY #0:LDA(frmstlow),Y:INC frmstlow
130CMP#0:BEQ dzero
140.dbyte
150LDY#0:LDA(frmstlow),Y:TAX:TAY
160.SS
170LDA(frmstlow),Y:STA(SCL),Y
180DEY:BNE SS
190TXA:CLC:ADC SCL:STA SCL
200LDA#0:ADC SCH:STA SCH:
210CMP#&6B:BNE TT
220LDA SCL:CMP#&FF:BNE TT
230RTS
240.TT
250TXA:CLC:ADC frmstlow:STA frmstlow
260LDA#0:ADC frmsthigh:STA frmsthigh
270INC frmstlow:BNE ZZ:INC frmsthigh
280.ZZ
290LDA(frmstlow),Y:BNE dzero
300INC frmstlow:BNE RR:INC frmsthigh
310.RR
320JMP dbyte
330.dzero
340LDY#0:LDA(frmstlow),Y:TAX
350TAY:LDA#0
360.UU
370STA(SCL),Y
380DEY:BNE UU
390TXA:CLC:ADC SCL:STA SCL
400LDA#0:ADC SCH:STA SCH
410CMP#&6B:BNE VV:LDA&72
420CMP#&FF:BNE VV
430RTS
440.VV
450INC frmstlow:BNE QQ:INC frmsthigh
460 .QQ
470LDA(frmstlow),Y:BNE dbyte
480INC frmstlow:BNE WW:INC frmsthigh
490.WW
500JMP dzero
510.init
520 LDA #0:STA frmstlow
530STA SCL:LDA#&62:STA SCH
540RTS
550.del PHA:TXA:PHA:TYA:PHA
560LDX#8:LDY#255
570.kk DEY:BNE kk:DEX:BNE kk
580PLA:TAY:PLA:TAX:PLA
590RTS
600 .store
610 JSR init
620 LDY #0:LDA (SCL),Y:BNE AA
630 STA (frmstlow),Y:INC frmstlow:JMP
     zero
640 .AA STA (frmstlow),Y:INC frmstlow
650 .byte
660 STY bcount:LDA frmstlow:STA
    templow
670  LDA frmsthigh:STA temphigh
680 INC frmstlow:BNE BB
690 INC frmsthigh
700 .BB
710 INC bcount:LDA (SCL),Y:STA
     (frmstlow),Y
720 INC SCL:BNE CC
730 INC SCH
740 .CC
750  INC frmstlow:BNE DD
760 INC frmsthigh
770 .DD
```

CHANJA



frame. Remember here that you must draw exactly the same number of lines as in the first frame. You can, of course, superimpose one line on another — for example, to transform a square into a triangle.

The program sets a limit of 30 to the number of lines per frame. By changing the value of NUMLN in line 10 you can increase this to a maximum of 42, but you are likely to run out of memory sooner. You can also run the program in Mode 5 and by inserting your own routines create colour animation.

To enter the program first type in and save listing 1. Now set Page to &1400 by typing

PAGE=&1400:NEW

Key in listing 2 and save it on another tape. Run it and follow its instructions to save the machine code it creates, after listing 1. Finally save listing 3 after the machine code file. The program can be saved to disc as it stands.

Disc copies of the program together with 10 data files — demonstrating, among other things, pulsating circles and oscillating waves — are available for £5 from Simon Woolf, 8 Sterndale Road, London W14 0HS. State whether you want 40 or 80 track discs.

```
780 LDA #&6C:CMP SCH:BNE EE
790 LDA bcount:STA (templow),Y
800 RTS
810 .EE
820 LDA (SCL),Y:BNE FF
830 LDA bcount:STA (templow),Y:JMP zero
840 .FF
850 LDA #255:CMP bcount:BNE BB:STA
  (templow),Y
860 LDA #0:STA (frmstlow),Y:INC
  frmstlow
870 BNE GG:INC frmsthigh
880 .GG
890 JMP byte
900 .zero
910 STY bcount
920 .HH
930 INC bcount:INC SCL:BNE JJ
940 INC SCH
950 .JJ
960 LDA #&6C:CMP SCH:BNE KK
970 LDA bcount:STA (frmstlow),Y
980 RTS
990 .KK
1000 LDA (SCL),Y:BEQ MM
1010 LDA bcount:STA (frmstlow),Y
1020 INC frmstlow:BNE LL
1030 INC frmsthigh
1040 .LL
1050 JMP byte
1060 .MM
1070 LDA #255:CMP bcount:BNE HH
1080 STA (frmstlow),Y:INC frmstlow
1090 BNE NN:INC frmsthigh
1100 .NN
1110 LDA #0:STA (frmstlow),Y
1120 INC frmstlow:BNE PP:INC frmsthigh
1130 .PP
1140 JMP zero
1150 .del PHA:TXA:PHA:TYA:PHA
1160 LDX #8:LDY #255
1170 .kk DEY:BNE kk:DEX:BNE kk
1180 PLA:TAY:PLA:TAX:PLA
1190 RTS

1200 ]:NEXT
1210 T=0:FOR N%=&1200 TO &1362:T=T+?N%:NEXT
1220 IF T<> 47412 PRINT "Typing error -check listing":
STOP
1230 PRINT "Now save the machine code after Listing 1"

1240 CLS:PRINT'':PRINT "Now save the machine code"
1250  PRINT "after Listing 1 by typing:"
1260 PRINT TAB(7,6)"*SAVE ""MPIC"" 1200 1370"
```

Listing 3.

```
10 REM Pikchachanja by Simon Woolf
11 REM Do NOT enter any REM statements.
12 REM This program must be run at &1400
14 REM If you wish to test the program
15 REM before completion, remove any CALL
16 REM statements. Do not press Break.
17 REM Avoid typing in superfluous spaces,
18 REM eg. at the end of lines
20 MODE4:HIMEM=&2200
22 REM or MODE 5
30 NUMLN=30:C1=&901:C2=C1+180
32 REM Change NUMLN for more lines (<43)
40 *FX15,1
50 VDU29,0;512;
60 VDU19,7,4,0,0,0,19,0,6,0,0,0
62 REM Change line 60 for different colours
70 VDU23,8202;0;0;0;
80 CLS:NUMLN=30:C1=&901:C2=C1+180
90 PRINT TAB(0,8)''" 1 - ENTER FRAMES"
100 PRINT " 2 - ANIMATE"
110 PRINT " 3 - SAVE DATA"
120 PRINT " 4 - LOAD DATA"
130 A$=GET$:IF A$>"4" OR A$<"1" THEN 130
140 CLS
150 IF A$="1" THEN PROCframe
160 IF A$="2" THEN PROCanimate
170 IF A$="3" THEN PROCsave
180 IF A$="4" THEN PROCload
190 GOTO 80
200 DEFPROCframe
210 CLS:PROCdb:CS=C1:NL=NUMLN:S%=0
220 FOR N=1 TO 2
230 X=100:Y=100:X1=100:Y1=100:L=0:P=1:inc=32:D=5:PRO
Cprint
240 PROCdraw: IF S%>750 THEN PRINT TAB(1,3)"NOT ENOU
GH RAM FOR FRAME. TRY AGAIN":TAB(1,5)"Press a key":A$=
GET$:GOTO 210
250 IF N=1 NL=L:CS=C2:PROCclear:PRINT TAB(2,27);NL;"
lines to draw";
260 NEXT:PROCbetween:ENDPROC
270 DEFPROCdraw
280 GCOL3,1:REPEAT:A$=INKEY$(0)
290 *FX15,1
300 IF A$="X"ANDX<=1279-inc THEN X=X+inc
310 IF A$="Z"ANDX>=0+inc THEN X=X-inc
320 IF A$=":"ANDY<=255-inc THEN Y=Y+inc
330 IF A$="/"ANDY>=0+inc THEN Y=Y-inc
340 IF A$="I" THEN inc=4+(inc=4)*-28:PRINTTAB(14,21)
;inc;" "
350 IF A$="D" THEN D=5+(D=5)*-64:PROCpoint
360 IF A$=CHR$(13) THEN PROCplot:X1=X:Y1=Y:IF S%>750
THEN ENDPROC
370 MOVE X1,Y1:PLOT D,X,Y
380 PRINT TAB(14,18);X;"  ";:PRINTTAB(14,19);Y;"  ";

390 MOVE X1,Y1:PLOT D,X,Y
400 UNTIL A$="F" OR L=NUMLN OR L=NL
410 ENDPROC
420 DEFPROCplot
430 IF (P=1 AND D=5) OR P=2 THEN GCOL0,1:MOVE X1,Y1:
DRAW X,Y:GCOL3,1:L=L+1:PRINTTAB(8,23);L+1;" ":P=1:ELSE
PLOT 69,X,Y:P=2
440 IF P=1 PROCstore:PROCch
450 PROCpoint
460 ENDPROC
470 DEFPROCstore
480 ?&900=L:L1=(L-1)*6:CS?L1=X1 MOD256:CS?(L1+1)=X1
DIV256:CS?(L1+2)=Y1:CS?(L1+3)=X MOD256:CS?(L1+4)=X DIV
256:CS?(L1+5)=Y
490 ENDPROC
500 DEFPROCpoint
510 IF D=5 THEN PRINTTAB(2,25);STRING$(10," "):ELSE
PRINTTAB(2,25);"Point: ";P;
520 ENDPROC
530 DEFPROCbetween
540 CLS:?&900=L:PROCdb
550 ?&74=0:?&75=&22:ADD=0
560 FOR F=0 TO 17
570 GCOL0,1:PRINTTAB(9,17);"Storing frame  ";F+1;
580 FOR N=1 TO L
590 L1=(N-1)*6
600 X1=C1?L1+256*C1?(L1+1):Y1=C1?(L1+2)
610 X2=C1?(L1+3)+256*C1?(L1+4):Y2=C1?(L1+5)
620 X3=C2?L1+256*C2?(L1+1):Y3=C2?(L1+2)
630 X4=C2?(L1+3)+256*C2?(L1+4):Y4=C2?(L1+5)
640 X%=X1-(X1-X3)*F/17:Y%=Y1-(Y1-Y3)*F/17
650 X1%=X2-(X2-X4)*F/17:Y1%=Y2-(Y2-Y4)*F/17
660 MOVE X%,Y%:DRAW X1%,Y1%
670 NEXT
680 PROCcall:PROCclear:NEXT
690 ENDPROC
700 DEFPROCcall
710 CALL 4700:ADD=ADD+3:?&74=0:?&75=&22+ADD
720 ENDPROC
730 DEFPROCsave
740 PRINT TAB(3,5)"Enter filename: ";:INPUT A$
750 S$="900":F$="B00":B=LEN(A$+S$+F$)+7
760 DIM BUFF B-1:X%=BUFF MOD256:Y%=BUFF DIV256
770 $BUFF="SAVE "+A$+" "+S$+" "+F$
780 CALL &FFF7
790 ENDPROC
800 DEFPROCload
810 PRINT TAB(3,5)"Enter filename: ";:INPUT A$
820 S$="900":B=LEN(A$+S$)+6
830 DIM BUFF B+1:X%=BUFF MOD256:Y%=BUFF DIV256
840 $BUFF="LOAD "+A$+" "+S$
850 CALL &FFF7:L=?&900
860 PROCbetween
870 ENDPROC
880 DEFPROCclear
890 GCOL0,0:MOVE1279,0:MOVE0,0:PLOT85,1279,255:PLOT8
5,0,255:GCOL3,1
900 ENDPROC
910 DEFPROCprint
920 PRINTTAB(14,6)"Frame ";(N=2)*-17+1
930 PRINTTAB(2,18)"X position: ";X;
940 PRINTTAB(2,19)"Y position: ";Y;
950 PRINTTAB(2,21)"Jump value: ";inc;" ";
960 PRINTTAB(2,23)"Line: 1"
970 PRINTTAB(2,25);STRING$(10," ")
980 ENDPROC
990 DEFPROCanimate
1000 PROCdb
1010 PRINTTAB(6,28)"Press space bar to pause":TAB(8,2
9)"Hold down S to stop"
1020 REPEAT
1030 FOR N=&22 TO &55 STEP 3
1040 ?&74=0:?&75=N:CALL 4600
1050 REPEAT UNTIL NOT INKEY(-99)
1060 P=INKEY(3)
1062 REM Increase Inkey value to slow down
1070 NEXT
1080 FOR N=&55 TO &22 STEP -3
1090 ?&74=0:?&75=N:CALL 4600
1100 REPEAT UNTIL NOT INKEY(-99)
1110 P=INKEY(3)
1112 REM Increase Inkey value to slow down
1120 NEXT
1130 UNTIL INKEY(-82)
1140 ENDPROC
1150 DEFPROCdb:MOVE0,-1:DRAW 1279,-1:MOVE0,257:DRAW 1
279,257:ENDPROC
1160 DEFPROCch:?&74=0:?&75=&52:CALL 4700
1170 S%=?&74+256*?&75-&52*256:IF S%>720 VDU7
1180 ENDPROC
```

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Competition



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The crystal ball

Exciting new releases planned by Adventure International include Robin of Sherwood (first in a series), the Fantastic Four (following on from Hulk and Spiderman in the QuestProbe series), Gremlins 2 and a new Scott Adams adventure called Buckeroo Banzai.

They are also twin-packing the first 12 Scott Adams adventures. Each twin-pack will cost £7.95 so you'll get two classic adventures for the price of one. Great value.

They also plan to do the same with Brian Howarth's excellent Mysterious Adventure series. And two more in this same series are soon to be released: After The Fire and Midwinter.

Talking of twin-packs, Sentient Software are publishing a series of adventures where you get two versions (Spectrum and Commodore 64) on the same tape, and at only £2.99. One of the series is reviewed this month but others include The Key To Time (reviewed previously in this column), Scoop, the Amulet and the Crystal Frog.

A helping hand

My thanks to the Dundee reader who wrote to correct the June tip for 1942 Mission. To completely solve the Parachute problem:—

(a) ETUH CARRA PEVO MER

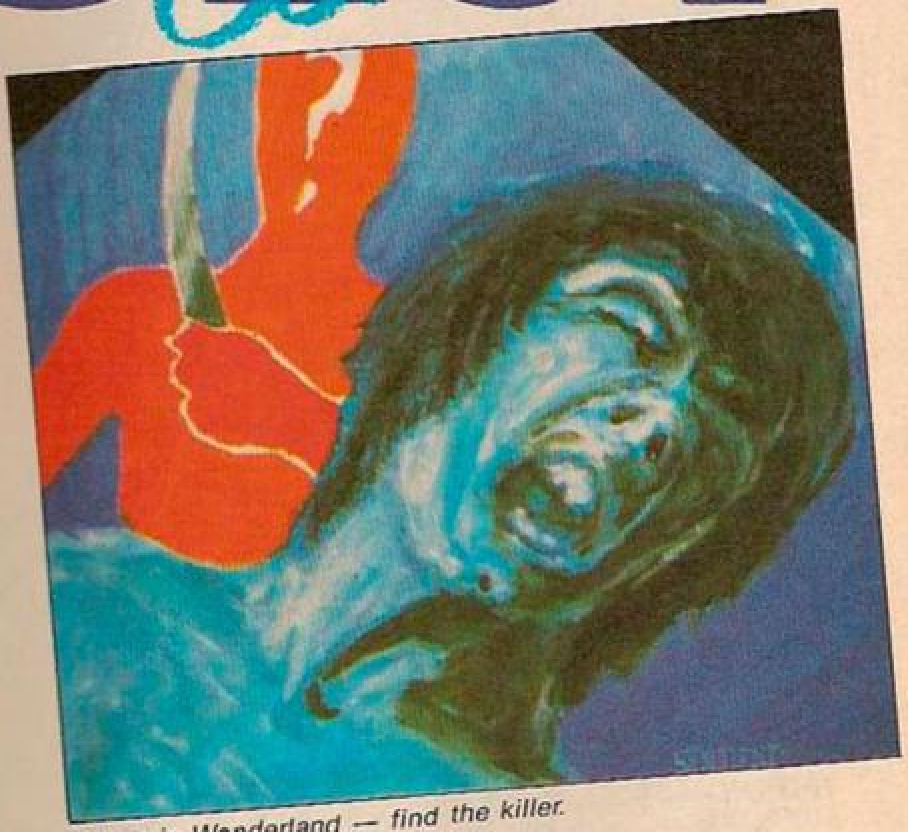
(b) LEWO RTHT IWEL OHGI D

(c) ETUH CARA PYRU B

For those bewitched by Infocom's Enchanter:—
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QUEST Corner

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Malice in Wonderland — find the killer.

Red Moon

- *Various*
- *£6.95*
- *Level 9 Computing*

THE DAY a new adventure from those Quest masters at Level 9 arrives is always a red letter day in my calendar. Red Moon, their very latest text and graphics fantasy, maintains their high standard and will bring much pleasure to their legions of fans.

Red Moon signals a departure from Level 9's earlier themes — it is their first adventure to have a purely magical theme and also features a combat system based on hit points.

The quest is set in a time when sorcery fills the air, when strange creatures roam the land and when fabulous treasure is there for the finding.

In this tale, you must try to recover the stolen Red Moon Crystal, the source of all Magic. You begin on a wide grassy plain. Over to the north, a smouldering volcano beckons. Looking east, a deep dark pothole calls for investigation. Nearby, a ruined lunar temple and a large lake entices.

Not Blue Moon.



Careful exploration brings quick rewards and should see you gaining entrance to an enormous castle. At some point you'll come across So9 the Newtling. So9's role may not be immediately obvious but at least the program tells you what a newtling is. Young and mischievous, newtlings are the offspring of dragons but lack much of the power and wisdom of their parents.

As well as recovering the Red Moon Crystal, there are nine treasures to be collected along the way. There are 12 spells available to you, 10 of which also require the possession of a certain object before they are effective.

For example, you must have a dagger when you cast the zap spell (attack enemies magically). Other spells include bounce (reverse fall), strong (become stronger), magic (tell if an object is magic), extinguish (put out fire) and snoop (look into nearby room).

Every one of the 208 plus locations is described both textually and graphically. The text descriptions are fulsome and atmospheric, the graphics (which can be toggled on and off) simple but fast and attractive. Please note that the Atari and Memotech versions are text only.

Malice In Wonderland

- *Spectrum/Commodore 64*
- *£2.99*
- *Sentient Software*

OFFERING GOOD value for money, Malice In Wonderland is a traditional-style text adventure.

You take the role of a secret agent whose job is to investigate the murder of a contact. The action takes place around and inside a manor house. One interesting thing about the adventure is that the program randomly picks the murderer from the five possible suspects at the start.

Wishbringer

- *Various*
- *£29.95 disc only*
- *Infocom*

WISHBRINGER starts you out as a postal clerk with a tyrannical boss. You have to deliver a letter to the old Magic Shop.

Once you've delivered the letter, the adventure really takes off. The letter is really a ransom note. In exchange for the return of a kidnapped cat, somebody signing herself as The Evil One wants the legendary Wishbringer Stone. It will be your task to award the stone and bring back the cat.

It's all great stuff. Like all Infocom adventures, the prose is of the highest quality.

I could do that...

August's competition challenged you to outdo John Ransley by writing a Snake program that was shorter and faster than the one he published in the same issue. We awarded the prize to one of our regular contributors, K. Suddick, 6 Ravel Court, Jarrow, Tyne & Wear, NE32 3BW.

Strictly speaking he should be disqualified on the grounds that he is far from being a beginner. But his Snake for the CBM-64 is such a triumph of programming ingenuity that it deserves to be published. The program runs twice as fast as John Ransley's but is 200 bytes shorter.

You control the snake using a joystick in Port 2. There is no scoring and nothing to eat but the idea is to keep the snake moving as long as possible. To make the task more difficult it grows a new segment every three seconds.

Inspired by the success of the Snake competition we are setting a similar problem for this month's £15 prize. Let's have a Basic version of Space Invaders in less than 20 program lines. The shorter and faster the better, even if it means leaving out the battlements and fielding a team of only one or two invaders.

```
10 [illegible]
20 [illegible]
30 [illegible]
40 [illegible]
50 [illegible]
100 PRINT"[illegible]
105 [illegible]
110 [illegible]
120 [illegible]
130 [illegible]
135 [illegible]
137 REM FOLLOWED BY INSERT CHARACTER
140 PRINT"[illegible]
150 [illegible]
160 [illegible]
200 [illegible]
205 [illegible]
210 [illegible]
220 [illegible]
225 [illegible]
230 PRINT"[illegible]
240 [illegible]
1000 [illegible]
1010 [illegible]
1470
```

BEGINNERS first bytes

Starting out in home computing? First Bytes is for you. Just write to *Your Computer* with any hardware or software problems, no matter how small or simple.

A bluffers' guide to micros

To win in computer conversations, learn to bluff *both ways*. Bigger and better is not always best, as I found when I told a pundit about my new Apricot. "I still swear by my ZX-81," he said virtuously. "That machine really opened the doors. It's amazing, even now, what you can make it do. . ." I was crushed — as though I'd boasted about my yummy microwaved Boeuf Stroganoff to someone who thought it immoral to eat anything but brown rice cooked by solar power.

Flexibility is the secret. How pityingly a certain friend looked at me, when I only had a Commodore 64 and sat for hours watching grass grow while my program loaded. (Before I bought the disc drive I'd sat even longer, watching continental drift.) My pal administered his put-down with great subtlety: "I envy you — my own computer isn't the sort you can get *games* for."

So I moved upmarket, credit card wilting like one of Dali's soft watches, and proudly I said to that friend, "It's nice to have an Apricot PC like yours — only I've invested in double-sided disc drives." He smiled reminiscently. "Yes. . . they weren't available with my original, prototype Apricot. ACT hadn't even finalized the plastic case — mine's built into a wooden box.



Probably quite a valuable curiosity now. We're thinking of having it french-polished."

While I reeled under *that* impact, he struck a new and treacherous blow. "Have you got into MS-DOS subdirectories yet?" Since reading the Apricot MS-DOS manual is not unlike deciphering Linear B script on the basis of three soiled potsherds, I merely mumbled — and sneaked home to have another go. Little did I know that a master bluffer was setting me up for the punch.

Next time we met in the pub, I was ready. After long nights of reseach my health was shattered (e.g. by the discovery that MS-DOS 2.11 disc subdirectories were incompatible with several MS-DOS 2.11 commands), but I was ready. "Spent a few minutes looking into subdirectories last night," I lied: "All quite simple."

"Yes, aren't they? Of course you won't find much use for them, until you get an add-on hard disc, like mine. . . ."

There seemed only one reply. I looked his squarely in the eye and said, "It's your round."

Yes: any fool can play a good card, but true bluffers win tricks with lousy ones — like that wretched wooden box. Do they sneer at your old Spectrum's disgusting keyboard? Just say with quiet confidence: "Actually, the need to press keys firmly is excellent typing discipline." (This was tried on me, but I spoilt the effect by involuntary hysterics.)

Does WordStar seem as ungainly as its cousin the Stegosaurus? One enthusiast (see *Whole Earth Software Catalog*) raves about the orgasmic thrill of typing the convenient mnemonic sequence Control-Q Q Control-B and reformatting a whole document — neglecting to mention that real word processors do this automatically.

Is your computer notoriously user-hostile? Explain that this is because it's so frightfully powerful. The Victor 9000 people make this a selling point, with ads explaining "It's not designed to be especially simple to use because learning to use it will not be a problem.." No, I don't understand that either. . . .

My coming Bluffer's Guide is titled *Zen and the Art of the Commodore 64*. It shows how to attain spiritual peace through timeless meditations on infinity and eternity, while counting bugs in Simon's Basic and waiting for the 1541 drive to load *Manic Miner*.

David Langford.

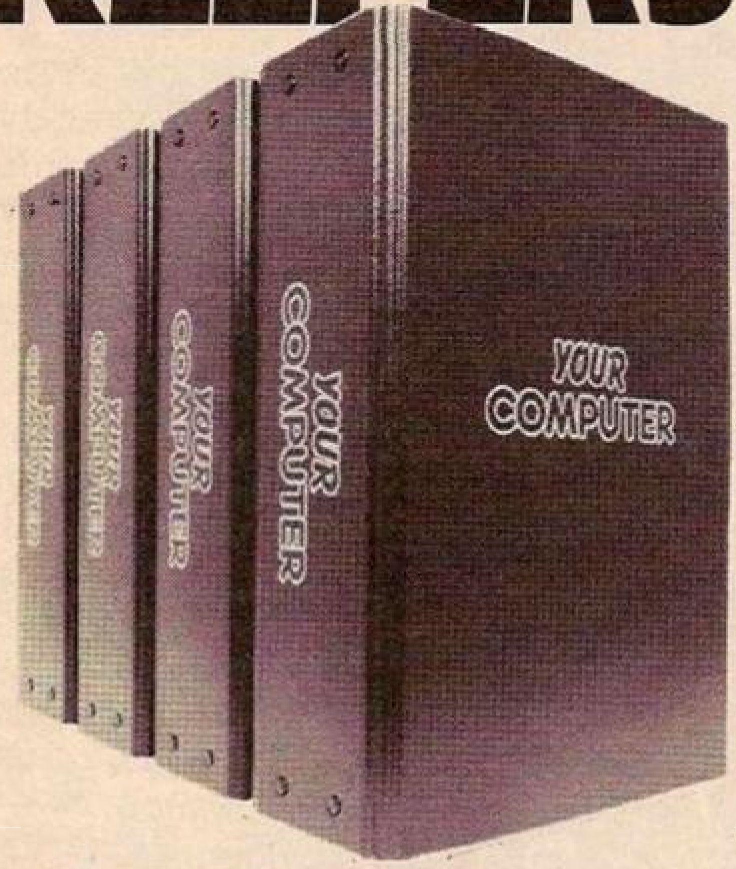
A Basic Logo course

Why should a Basic programmer learn Logo as a second computer language? What programs can be written in Logo that can't be written in Basic?

The short answer is, none; but Logo is better suited to some types of program that Basic is, and enables you to write them more quickly and economically. Perhaps more important, though, is the difference in thought processes between programming in the two languages.

It's the fact that you have to *(continued on page 93)*

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(continued from page 91)

think differently when writing in Logo that underlies Logo's importance as an educational language. Many home computer Logos are designed mainly for educational use, following the guidelines set out by Logo originator Seymour Papert, and most have good manuals.

To a Basic programmer, it can be difficult to realise how many elements of the language are optional. What! languages with *no line numbers?* What! languages in which you don't write programs at all? Both these things are true of Logo.

In Logo you write short procedures, procedures which call on other procedures, procedures which call those procedures, and so on. You don't run a special kind of thing called a program: you run one of these procedures, no different in essence from any other procedure.

From another angle, you might think of each Logo procedure as the definition of a word in the Logo language. Words which you define yourself — say, Square, or Picture — can be used — once their definitions have been loaded into memory — in just the same way as words defined for you by the Logo interpreter like Forward or Penup. The name of a procedure/program is just another, comparatively specialised Logo word.

Logo grammar is based on the list-processing idea and can make a good introduction to other more impenetrable list processing languages such as Lisp and Prolog. Logo itself has two basic strengths. One is turtle graphics, the type of graphics, using relative rather than absolute co-ordinates, that can control a "turtle" robot on the floor as well as mock-turtle cursor on the screen.

The other is formal list processing, which is particularly useful for the creation and

BEGINNERS first bytes

manipulation of databases. Though other types of program can be written in Logo, most Logo programs are either database-oriented or graphics-oriented.

Logo interpreters are available for most, if not all, popular home computers. Be cautious in choosing one. The best interpreters are written in assembly language or a low-level like C; mock-Logos written in Basic will be much less versatile, and far slower in operation.

The word "Logo" is sometimes applied to sets of turtle-graphics subroutines that don't include proper list-processing facilities.

The number of command words defined in the interpreter is not too important: it's easy to add more. What *is* more important is the support for screen handling and for peripheral devices.

A good Logo will handle multiple turtles, rather like sprites on screen: some will handle only one, making graphic programming much more cumbersome. Look out, too, for Logos whose syntax keeps reasonably close to the MIT standard pioneered by Papert.

Susan Curran.

Difference between different Basics



THERE IS NO such thing as a standard Basic. Or rather there are a number of standard Basics. By dint of its popularity, the most standard in the microcomputer world is Microsoft Basic. On the other hand the standard version of the language in the British educational market is BBC Basic. Here is a look at some of the versions of Basic available for more up-market machines.

Microsoft Basic is the best-known dialect of computing's most popular language. Commonly known as MBasic, it is the grandaddy of nearly all home computer Basics. It is used on business machines like the IBM-PC and the Apricot. There is a special implementation of MBasic — called version 2.0, for the Apple Macintosh that makes special use of the machine's facilities.

The program uses a list window which can both edit and debug a program. There is a mode which allows the user to run a program and see the results of that program's actions appear in one window, while highlighting the sections of code being used in another. Programs can be halted or suspended using the mouse.

A number of commands exist to allow the mouse to be used. so within a Basic program you can read the position of the mouse and determine whether the button is pressed — or not. Input and output is device independent, that is output files can be sent to the screen, the printer or a disc. More than anything else, the Mac is a graphics machine and Microsoft Basic makes the most of those graphics by using the famous inbuilt Quickdraw routines.

MSX Basic is directly derived from the original Microsoft dialect, as are the versions of Basic used by the Commodore micros — though Microsoft disown the awful implementation of Basic on the Commodore 64.

CBasic is Digital Research's answer to Microsoft Basic and can be found on a number of CP/M micros. Its special feature is the way that it allows you to write complex user-defined functions with many program lines. These effectively function as mini-programs, or as procedures.

ANSI Basic is another attempt to a 'standard' version of the language. It took the ANSI committee the best part of 10 years to define the language, but although it is very good, the computer world has not exactly taken to it. You can find a version of it on the Enterprise range of computers — called IS-Basic.

IS-Basic allows long variable names and is highly structured, more so than BBC Basic. Listings look a little like Pascal listings and there are some interesting commands. Like CBasic, IS-Basic allows multi-line functions — which makes for some elegant structured programming, as does the Do. . .While and Do. . .Until constructions.

A particularly nice feature is the way that If. . .Then. . .Else works, with program blocks between the If, Then and Else, rather than mere commands as in other Basics. A further neat construction is Select. . .Case, which enables program control to be sent to a block determined by the value of a variable.

GWBasic is known as 'Gee-Whizz Basic' — apparently the Americans liked it when they first saw it. Underneath all the razzamatazz, GWBasic is essentially the same as Microsoft Basic with some extra commands to handle high-resolution graphics, sound, light-pen and all the frills of home computing.

The other main improvement over MBasic is that it has a screen editor, not very different from the one found on Commodore computers.

Big computers have big Basics. Hewlett-Packard's Basic is more than 200K, but it is designed to be used for scientific calculations, and has a whole host of built-in functions to handle matrices and the like is included. DEC Basic-Plus is another version of the language designed to run on huge machines.

On the whole, Basic is not a portable language. That is, programs written in one version of Basic are not likely to run on machines using a different version of the language. However right at the very top of the computer market there is a portable Basic called BLS, the Basic Language System. Like the Basics we know and love on home machines it is interactive and is easy to use.

With BLS, a programmer can write an application program on any system, and that program can be compiled to more or less any other system provided it uses a commonly found operating system. Unfortunately this does not apply to many home computers, though programs can be developed in BLS for the QL and MS-DOS computers.

Bill Bennett.

COMMODORE 64, BBC AND SPECTRUM

THE PROGRAMS given here will enable Spectrum, BBC, and CBM-64 owners to download via *Your Computer's* Telsoft service. Each month for each machine we transmit at least one — and usually two — of the main programs appearing in the current issue. Also available is the full user to user communications program, Dialsoft.

So far OE LTD's Telemod 2 and the VTX 5000 modems have been tested with the BBC and Spectrum but the service also works with

```
5 REM    HEX LOADER FOR CBM 64    FIG.1
6 REM
10 FOR I=680 TO 727:READA:POKEI,A:T=T+A
20 NEXT:IF T=6716 THEN GOTO 100
30 PRINT"ERROR IN DATA ";T-6716:END
40 DATA 169,1,133,186,169,1,133,184
50 DATA 133,185,169,8,133,183,169,208
60 DATA 133,187,169,2,133,188,169,56
70 DATA 133,251,169,199,133,252,169,251
80 DATA 162,231,160,206,32,216,255,96
90 DATA 68,79,87,78,76,79,65,68
100 SA=51000:LA=52855
110 INPUT"START ADDRESS";A
120 IF (A<SA) OR (A>LA) THEN GOTO 140
130 IF A/8=INT(A/8) THEN GOTO 150
140 PRINT:PRINT"ADDRESS ERROR":GOTO 110
150 T=(A-32768)AND255:PRINTA;:INPUTD$
160 IF D$="END" THEN GOTO 900
170 IF LEN(D$)=20 THEN GOTO 190
180 PRINT"WRONG LENGTH":GOTO 150
190 FOR B=0 TO 7:B$=MID$(D$,2*B+1,2)
200 GOSUB 300:IF E=1 THEN GOTO 280
210 POKE A+B,D:T=T+D:NEXT
220 B$=MID$(D$,18,3):GOSUB 300
230 IF E=1 THEN GOTO 280
240 IF T=D THEN GOTO 260
250 PRINT"CHECKSUM ERROR":GOTO 150
260 A = A+8:IF A<LA THEN GOTO 150
270 GOTO 800
280 PRINT TAB(8+2*B+D)C$"??"
290 B=8:NEXT:GOTO 150
300 E=0:D=0:FOR N=1 TO LEN(B$)
310 C$=MID$(B$,N,1):GOSUB 400
320 IF E=1 THEN D=N:N=4:NEXT:RETURN
330 D=D*16+X:NEXT:RETURN
400 X=ASC(C$)-48:IF X<0 THEN E=1:RETURN
410 IF X<10 THEN RETURN
420 X=X-7:IF X<10 THEN E=1:RETURN
430 IF X>15 THEN E=1
440 RETURN
500 H$="0123456789ABCDEF"
510 FOR A=SA TO LA STEP 8
520 PRINT A;"? ";:T=(A-32768)AND255
530 FOR B=0 TO 7:X=PEEK(A+B):GOSUB 600
540 T=T+X:NEXT:PRINT"=";
560 Y=INT(T/256):PRINT MID$(H$,Y+1,1);
570 X=255 AND T:GOSUB 600:PRINT
580 NEXT:GOTO 900
600 PRINT MID$(H$,INT(X/16)+1,1);
610 PRINT MID$(H$,1+(XAND15),1);:RETURN
800 SYS 680:C$=CHR$(34)
810 PRINT:PRINT" TO RELOAD CODE :"
815 PRINT:PRINT"  LOAD"C$"DOWNLOAD";
820 PRINTC$",1,1  (RETURN)"
825 PRINT:PRINT"  THEN TYPE  NEW";
830 PRINT"  (RETURN)"
835 PRINT:PRINT"TO RUN THE PROGRAM".
840 PRINT"  SYS 51000  (RETURN)"
900 PRINT:PRINT:PRINT"1  ENTER DATA"
910 PRINT:PRINT"2  PRINT DATA"
920 PRINT:PRINT"3  SAVE DATA"
930 INPUT Z:ON Z GOTO 100,500,800
```

```
51000 ? A9068D21D08D20D0=3E2
51008 ? A90F8D8602A90E20=2E4
51016 ? D2FFA9008D15D0A9=4DD
51024 ? FF8D8A02BA8E92CE=510
51032 ? 20CAC920C7CB20F8=4D5
51040 ? CAAD80CEC931F023=532
51048 ? C935F014C936D006=43F
51056 ? 208EC74C5BC7A914=410
51064 ? 20D2FF202FCBD0DB=52E
51072 ? 203FC8A92020D2FF=461
51080 ? 4C93C94C4AC82063=411
51088 ? CC2022CDA95B85FD=4F1
51096 ? A9CE85FE2028CDA0=547
51104 ? 002095CC202FCBC9=404
51112 ? 44F00BC954D0ED20=4E1
51120 ? D2FFA901D007A944=4EF
51128 ? 20D2FFA90885BA20=4B9
51136 ? 25CDA90820ABCCA9=4A3
51144 ? BD85FDA9CD85FEA0=6A0
51152 ? 002095CC2025CD20=383
51160 ? 95CC9848A0048C83=4CC
51168 ? CE20D8C968A82025=4C4
51176 ? CD2095CC9848A906=4C5
51184 ? 8D83CE20D8C9ADA7=5E3
51192 ? CE85FBADA8CE85FC=6EA
51200 ? 68A82060CBA90185=38A
51208 ? B885B998A293A0CE=539
51216 ? 20BDFFAEA9CEACAA=567
51224 ? CEE8D001C82025CD=479
51232 ? A9FB20D8FF20F1CB=597
51240 ? 6820D9CCC90DD00B=3FE
51248 ? A90085C7A92020D2=3E0
51256 ? FFA90D20D2FF60A9=4E7
51264 ? 0D2029C8A90D20D2=306
51272 ? FF602063CCA000A9=43F
51280 ? FF9993CEC8D0FA20=5FB
51288 ? D2CB90FB20D2CBB0=5ED
51296 ? FB8D72CEA0008C7C=4D0
51304 ? CE8C7DCE202ECCAD=4D4
51312 ? 72CE29F0C980D0E4=5C6
51320 ? 20D2CBB0DA9973CE=599
51328 ? C8202ECCC009D0F0=4EB
51336 ? A000AD76CE2980D0=492
51344 ? 0FA52B85FB18A52C=3D8
51352 ? 6D75CE85FC4CAAC8=587
51360 ? AD78CE85FBAD79CE=607
51368 ? 85FC20D2CBB0A820=55E
51376 ? D9CC20D2FFC820D9=607
51384 ? CC202ECCC010D0EA=528
51392 ? A92020D2FFAD75CE=56A
51400 ? 202ECD20D2CBB087=4D7
51408 ? CD7CCEF00BA95820=503
51416 ? D2FF2030C84C57C8=52C
51424 ? 20D2CBB0F8CD7DCE=65D
51432 ? D0EBAD75CEA8B993=687
51440 ? CED00E2030C8A991=4EE
51448 ? 20D2FF4C7EC94C57=51F

51456 ? C8A0008C7CCE8C7D=447
51464 ? CE20D2CBB0F091FB=5BF
51472 ? 202ECCC8CC77CED0=4D3
51480 ? F020D2CBB0E0CD7C=59E
51488 ? CEF008A95820D2FF=4D8
51496 ? 4C57C820D2CBB0CE=4CE
51504 ? CD7DCEF0034C23C9=473
51512 ? 20ACCB2030C8AD75=409
51520 ? CEA8A9009993CEAD=506
51528 ? 84CEC902D02520BC=436
51536 ? CBA9C820F3CBA955=568
51544 ? 2016CDA95020F3CB=432
51552 ? 20C7CBAC73CEC888=54F
51560 ? B993CED02398D0F7=5D4
51568 ? 4C5BC7A9552016CD=3DF
51576 ? 20F1CB4C63C9AC77=4EF
51584 ? CE20D2CB88D0FA20=57D
51592 ? D2CB20D2CB4C47C9=53E
51600 ? 4C5CC8A52B85FBA5=4F5
51608 ? 2C85FCA000B1FB99=52A
51616 ? 2200C8B1FB8523F0=4CE
51624 ? 0BA52285FBA52385=447
51632 ? FC4C9BC918A5FB69=57D
51640 ? 02852D852F8531A5=37B
51648 ? FC6900852E853085=412
51656 ? 32602063CCA9028D=3E1
51664 ? 84CEA90B8D02DE60=4A3
51672 ? 8E81CE8C82CEA200=533
51680 ? A9098DCDCE202FCB=4D4
51688 ? C914F016C90DF051=4E2
51696 ? C924D01920D2FF8D=544
51704 ? C3CEE84CE5C9E000=64B
51712 ? D0E3E000F0DF20D2=554
51720 ? FFCA4CE5C9C93090=554
51728 ? D4C93A901548ADC3=444
51736 ? CEC924F004684CE5=460
51744 ? C968C94190BFC947=4BA
51752 ? B0BB20D2FF38E930=4D5
51760 ? C90A9002E907E005=36A
51768 ? F0AB9DC3CEE84CE5=61A
51776 ? C9E000F0A0E001D0=52A
51784 ? 07ADC3CEC924F095=4FF
51792 ? A92020D2FFA9FF9D=54F
51800 ? C3CEA2008ECFCE8E=544
51808 ? D0CE8ED1CE8ED2CE=659
51816 ? ADC3CEC924D006A9=512
51824 ? 0F8DCDCEE8BDC3CE=5DD
51832 ? C9FFF01D20CBCAB0=5B2
51840 ? 3418BDC3CE6DCFCE=524
51848 ? 8DCFCEA9006DD0CE=566
51856 ? 8DD0CEB020E84C75=534
51864 ? CAADCFCEAC83CE99=642
51872 ? A3CEC8ADD0CE99A3=660
51880 ? CEC8188C83CEAC82=561
51888 ? CEAE81CE602025CD=4ED
51896 ? A200BD41CEC921F0=500
51904 ? 0720D2FFE84CBACA=570
51912 ? 4CDEC9ADCDCE8DCE=65E

51920 ? CEADCFCE8DD1CEAD=6C1
51928 ? D0CE8DD2CE18ADD1=639
51936 ? CE6DCFCE8DCFCEAD=68F
51944 ? D2CE6DD0CE8DD0CE=6BE
51952 ? B005CECECED0E660=625
51960 ? 2063CCA90F8D8602=414
51968 ? A95185FDA9CD85FE=575
51976 ? A000209DCC2025CD=343
51984 ? 209DCC209DCC209D=3DF
51992 ? CC2022CD20A9CC20=3A8
52000 ? 95CC2022CD2095CC=411
52008 ? 202FCB20D2FF608E=421
52016 ? 81CE8C82CE2069CC=4B0
52024 ? 20ECCC20CACCC900=48F
52032 ? D00D20FDCCC931F0=4F0
52040 ? 062001CC4C35CB8D=314
52048 ? 80CEAE81CEAC82CE=597
52056 ? 60AE92CE9A4C5BC7=4CE
52064 ? 2022CDA92285FDA9=465
52072 ? CE85FEA0002095CC=4DA
52080 ? 2025CDA00FA92099=393
52088 ? 93CE88D0FA8D93CE=619
52096 ? 202FCBC914D010C0=417
52104 ? 00F0F520D2FF88A9=58F
52112 ? 209993CE4C80CBC9=50A
52120 ? 0DF00B20D2FF9993=4BD
52128 ? CEC8C010D0DAA920=579
52136 ? 20D2FF60A92020D2=4B4
52144 ? FFA94F20D2FFA94B=58C
52152 ? 20D2FF60A9138D00=452
52160 ? DEA9128D00DE60A9=4CD
52168 ? 538D00DEA9528D00=40E
52176 ? DE60A996188D07CE=547
52184 ? 8C82CEAC82CE2004=4D4
52192 ? CC20ECCCCE87CED0=677
52200 ? 02386020FDCCB0EE=509
52208 ? 60A9FA8C82CEA820=597
52216 ? 04CC88D0FAAC82CE=616
52224 ? 602004CC8AA2A8CA=3EE
52232 ? D0FDAA2069CC6020=454
52240 ? 25CDA90220ABCC20=364
52248 ? 95CCAD8ECE20D2FF=573
52256 ? A92020D2FFA90320=3A6
52264 ? ABCC20D8C9604D7D=48A
52272 ? CE8D7DCEA208AD7D=4AA
52280 ? CE2A9010AD7DCE49=411
52288 ? 088D7DCEAD7CCE49=460
52296 ? 108D7CCE2E7CCE2E=3D5
52304 ? 7DCECAD0E160A000=516
52312 ? A9009900D4C8C018=40E
52320 ? D0F660A99320D2FF=5B3
52328 ? 6048A5A2290FD01F=37E
52336 ? A5D448A5A22910F0=4A1
52344 ? 05A9A44C80CCA920=42B
52352 ? 20D2FFA90085D4A9=51C
52360 ? 9D20D2FF6885D468=53F
52368 ? 6020D2FFCB81FDC9=620
52376 ? 21D0F6C8602025CD=4B9

52384 ? A90C20ABCC2095CC=46D
52392 ? 60A9058E81CEAAA9=4E6
52400 ? 2020D2FFCAD0FAAE=503
52408 ? 81CE60C914F008C9=505
52416 ? 7FF00160A91460A9=456
52424 ? 7F6020E4FFC9C190=5C4
52432 ? 07C9DBB00338E960=4AF
52440 ? 60C941900EC95B90=494
52448 ? 08C9619006C97BB0=49C
52456 ? 02492060488A4808=2D5
52464 ? 20E1FFD0034C59CB=533
52472 ? 2868AA6860AD00DE=485
52480 ? 49016A9003A90060=250
52488 ? AD01DE6048AD00DE=3C7
52496 ? 49026A6A6860200C=223
52504 ? CDB0FB8D01DE20EC=508
52512 ? CC602025CD2028CD=373
52520 ? A90D20D2FF604829=3A0
52528 ? F06A6A6A6A0930C9=3CA
52536 ? 3A300318690720D2=21F
52544 ? FF68290F0930C93A=31B
52552 ? 300318690720D2FF=2F4
52560 ? 60444F574E4C4F41=2C4
52568 ? 44204D454E552131=243
52576 ? 2020205245434549=228
52584 ? 5645213520202045=1FE
52592 ? 58495420544F2042=28A
52600 ? 4153494321362020=22F
52608 ? 2053415645204259=28A
52616 ? 5445532128205553=285
52624 ? 4520122053544F50=26D
52632 ? 209220544F205245=2C4
52640 ? 5455524E20544F20=2CC
52648 ? 4D454E5520292145=28C
52656 ? 4E544552204E554D=2F9
52664 ? 4245522021494620=281
52672 ? 4144445245535320=2E6
52680 ? 495320494E204845=2C8
52688 ? 582C119D9D9D9D9D=476
52696 ? 9D9D9D9D9D9D9D9D=5C0
52704 ? 9D9D9D9D50524546=481
52712 ? 4958205749544820=305
52720 ? 2421535441525420=2E3
52728 ? 4144445245535320=31E
52736 ? 464F522041524541=220
52744 ? 202146494E414C20=1D3
52752 ? 4144445245535320=236
52760 ? 464F522041524541=238
52768 ? 202150524F475241=22C
52776 ? 4D205449544C4520=237
52784 ? 284D415820313620=1E5
52792 ? 4348415227532920=219
52800 ? 21124E4F54205641=21B
52808 ? 4C4944922C205452=2A5
52816 ? 5920414741494E20=249
52824 ? 3A20214449534320=216
52832 ? 4F52205441504520=26B
52840 ? 2820442F54202920=1E0
52848 ? 3F21000000000000=0D0
```

TELSOFT



A reminder of how to use the Telsoft service.

a number of other makes. For the CBM-64 it will initially only be available with the OEL Comms pack together with the Telemond 2 or similar modem; later we hope to adapt the service to work with Commodore's modem.

To enter the download program first type in the hexloader for your machine — figure 1 — and then enter the machine code — figure 2. Once the program has been saved you can run it by entering CALL &6000 on the BBC, SYS 51000 on the CBM 64, RANDOMIZE USR 60000 on the Spectrum.

To find out what is available and how to receive software dial up Colchester (0206) 8068. This audio recorded information line will also advise you which telephone numbers to ring for the 300 and 1200 bit/s services.

When a program you want to download is on line, make sure your modem is set up and dial the number appropriate to its speed. As soon as you hear the modem tones switch the modem to line and replace the receiver. Select Option 1 from the menu — Receive. After a block of data is received you will see "OK" printed if there are no errors, otherwise the program will wait for the blocks to come round again. When the "Program loaded OK" message appears return to the Telsoft menu and select Option 5. You can now save and run the program.

Note that CBM-64 owners will need to use Option 6 if machine code is to be saved.

Figure 1. BBC.

```
10 REM BBC HEX CODE LOADER
15 HIMEM=&69FF
20 CLS:PRINT
30 INPUT " START ADDRESS (Hex)";A$
40 A=EVAL("&"+A$)
50 IF A>&6F87 THEN 280
60 IF A<&2A00 OR A>&6FE7 THEN 20
70 PRINT ~A" ";
80 INPUT ":" B$,C$
90 IF LEN(B$) <>16 THEN 50
100 T=0
110 FOR N=0 TO 7
120 X$= MID$(B$,2*N+1,1): GOSUB 300
130 IF E=1 THEN 260
140 X$= MID$(B$,2*N+2,1): GOSUB 300
150 IF E=1 THEN 260
160 B= EVAL("&"+MID$(B$,2*N+1,2))
170 ?A=B:A=A+1:T=T+B
180 NEXT
190 FOR M = 1 TO LEN (C$)
200 X$=MID$(C$,M,1):GOSUB 300
210 IF E =1 THEN A=A-1: GOTO 260
220 NEXT
230 IF T= EVAL("&"+C$) THEN 50
240 PRINT "CHECKSUM ERROR !"
250 A=A-8:GOTO 50
260 PRINT "TYPING ERROR !"
270 A=8*(A DIV 8):GOTO 50
280 *SAVE "DOWNLOAD" 6A00 6F87
290 END
300 E=0:IF ASC(X$)<48 THEN E=1:RETURN
310 IF ASC(X$)<58 THEN RETURN
320 IF ASC(X$)<65 THEN E=1:RETURN
330 IF ASC(X$)>71 THEN E=1
340 RETURN
```

Figure 2. BBC.

```
6A00 :A9CBA0FEA20120F4,4C6
6A08 :FF20616C20486DC9,38A
6A10 :31F000C934F0E9C9,4CB
6A18 :35F0064C0C6A4C47,200
6A20 :6AA90C20E3FFA9E8,482
6A28 :A000A2FF20F4FFA9,4FD
6A30 :03A20020F4FFA902,363
6A38 :A20220F4FFA9C8A0,4C0
6A40 :FEA20020F4FF60A9,48C
6A48 :0C20E3FF20F760A9,439
6A50 :15A20120F4FFA000,3E8
6A58 :A9FF8099056FD0FA,507
6A60 :A915A20120F4FF20,394
6A68 :0C6C90F0200C6C00,340
6A70 :F8A0000477047004,416
6A78 :79847A0478057020,380
6A80 :D56DA57029F0C900,489
6A88 :D0E2200C6C08D099,468
6A90 :7100C820D56DC009,364
6A98 :D0F0A000A5742900,422
6AA0 :D000A51C057610A5,354
6AA8 :1D65730577200C6C,209
6AB0 :800520E3FFC820D5,524
6AB8 :6DC010D0F0A57320,435
6AC0 :B26D200C6C00A0C5,3CC
6AC8 :7AF000A95020E3FF,478
6AD0 :20E7FF4C676A200C,34F
6AD8 :6C000CC57BF000A9,40C
6AE0 :5820E3FF20E7FF4C,4AC
6AE8 :676AA573A009056F,43E
6AF0 :D00E20E7FFA90020,380
6AF8 :E3FF4C036B4C676A,469
6B00 :A000847A047B200C,2C9
6B08 :6C00F2917620D56D,477
6B10 :C8C475D0F1200C6C,45A
6B18 :80E3C57AF000A958,4CE
6B20 :20E3FF20E7FF4C67,400
6B28 :6A200C6C00CFC570,3C1
6B30 :F000A95020E3FF4C,447
6B38 :676A20C76820E7FF,429
6B40 :A573A0A90099056F,3F6
6B48 :A58AC902D05020D7,419
6B50 :6BA9C820556CA955,388
6B58 :20306EA95020556C,298
6B60 :A915A20120F4FF20,394
6B68 :F768A471C8080985,505
6B70 :6FD05190D0F7A90C,4A4
6B78 :20E3FF20A56DA95A,437
6B80 :0582A96F8583A907,3D7
6B88 :20006E20F86D20A0,2D8
6B90 :6DA90520006EA900,2DA
6B98 :20E3FF20F86DA9D2,582
6BA0 :20E0FF4C0C6AA955,38F
6BA8 :20306EA99620556C,2DE
6BB0 :4C6A6BA475200C6C,2D2
6BB8 :80D0FA200C6C200C,316
6BC0 :6C4C486B4C6C6AA9,336
6BC8 :2020E3FFA96F20E3,43D
6BD0 :FFA96B20E3FF60A9,51E
6BD8 :9CA000A68AE002D0,41E
6BE0 :0BA21320F4FFA212,387
6BE8 :20F4FF60A29720F4,4C0
6BF0 :FFA29620F4FF60A9,553
6BF8 :9CA000A68AE002D0,41E
6C00 :EBA25320F4FFA252,4E7
6C08 :20F4FF6018A99685,44F
6C10 :8F847EA991A20020,38D
6C18 :F4FFB009C007D085,448
6C20 :6B6B4C0C6AA47E20,2D4
6C28 :496CC68FD0023860,374
6C30 :A58AC902D0062079,369
6C38 :6E80EC60A991A201,447
6C40 :20F4FF90A47E80DF,35C
6C48 :608AA2D2CAE8CAD0,3AA
6C50 :F8AA60A900847EA8,458
6C58 :20496C80D0FAA47E,449
6C60 :60A9E8A000A2FF20,452
6C68 :F4FFA900058AA90C,460
6C70 :20E3FF20A86DA904,3E4
6C78 :20006EA9098582A9,2F0
6C80 :6F8583A00020F86D,39C
6C88 :20156DC941F008C9,370
6C90 :42F011C943F0174C,3A2
6C98 :616CA900A20120F4,335
6CA0 :FF4C876CA900A203,3C4
6CA8 :20F4FF4C876CA900,433
6CB0 :A20420F4FFE68AA5,4CE
6CB8 :7C20E3FFA47E20A8,46B
6CC0 :6DA90020006E20F8,2C4
6CC8 :6DA01720156DC941,2D0
6CD0 :F008C942F011C943,413
6CD8 :F0174C616CA907A2,372
6CE0 :0120F4FF4C096DA9,37F
6CE8 :07A20320F4FF4C09,314
6CF0 :6DA907A20420F4FF,3D6
6CF8 :E68AA58AC907D009,443
6D00 :A9E8A000A20120F4,3E8
6D08 :FFA57C20E3FF2053,495
6D10 :6C20536C6020A86D,2E3
6D18 :A90520006E20F86D,2C1
6D20 :20A86DA90520006E,274
6D28 :20F86D20A86DA905,36B
6D30 :20006E20F86D20A8,2DE
6D38 :6D847EA90320006E,2A9
6D40 :A9D220E0FF857C60,4D8
6D48 :A90C20E3FF20A86D,3EF
6D50 :A90720006EA99A05,306
6D58 :82A96E8583A00020,361
6D60 :F86D20A86D20996D,3C0
6D68 :20996D20996D20A0,317
6D70 :6DA90A20006E20F8,2C6
6D78 :6D20A86DA9022000,270
6D80 :6E20F86D20A86D20,348
6D88 :E7FFA9D220E0FF40,5A8
6D90 :A90FA20020F4FF60,3D5
6D98 :60A90020006E20F8,287
6DA0 :6D20A86D6020A86D,33A
6DA8 :20A86D20E7FF20E7,445
6DB0 :FF604029F06A6A6A,3FE
6DB8 :6A0930C93A300310,1F1
6DC0 :690720E3FF60290F,312
6DC8 :0930C93A30031069,1F0
6DD0 :0720E3FF60457B05,3AE
6DD8 :7BA200A57B2A900C,300
6DE0 :A57B4900857BA57A,390
6DE8 :4910857A267A267B,299
6DF0 :CAD0EB6020E3FFC8,5AC
6DF8 :8102C90DD0F6C860,4F7
6E00 :B67DAAA92020E3FF,478
6E08 :CAD0FAA67D60C97F,55F
6E10 :D000A98620F4FFE0,4FD
6E18 :00F012A97FC92000,3C3
6E20 :0EC90AF00AC90DF0,3A1
6E28 :06C907F002A90060,2D1
6E30 :857C867D847EA991,440
6E38 :A20120F4FFA903A2,404
6E40 :0720F4FFA996A200,403
6E48 :20F4FF982902F0F4,4BA
6E50 :A47CA997A20920F4,41F
6E58 :FFA903A20420F4FF,464
6E60 :A991A20020F4FFB0,49F
6E68 :09C007D0056B6B4C,2C1
6E70 :0C6AA57CA67DA47E,3DC
6E78 :60847E867DA996A2,446
6E80 :0020F4FF982901F0,3CD
6E88 :0BA996A20920F4FF,400
6E90 :9810900138A67DA4,340
6E98 :7E60444F574E4C4F,201
6EA0 :4144494E47204D45,215
6EA8 :4E550D3120202052,193
6EB0 :4543454956450D34,1F2
6EB8 :2020205345542042,1AE
6EC0 :6175642052617465,2E6
6EC8 :0D35202020455049,100
6ED0 :5420544F20424153,20D
6ED8 :49430D454E544552,217
6EE0 :204E554D4245520D,1F6
6EE8 :2020555345204354,1EC
6EF0 :524C204720544F20,1F5
6EF8 :52455455524E2054,254
6F00 :4F204D454E552029,1ED
6F08 :0D53455420545241,200
6F10 :4E534D4954204261,24E
6F18 :756420526174650D,292
6F20 :4120202037352042,16F
6F28 :6175640D42202033,1FC
6F30 :303020426175640D,209
6F38 :4320313230302042,180
6F40 :6175640D53455420,253
6F48 :5245434549564520,223
6F50 :4261756420526174,2C3
6F58 :650D50524F475241,23D
6F60 :4D20204C4F414445,1F2
6F68 :4420206F6E0D5052,20D
6F70 :45535320414E5920,213
6F78 :4B455920464F5220,218
6F80 :4D454E550D202020,1A2
```

Figure 1. Spectrum.

```
5 REM SPECTRUM 48k        fig 1
10 REM Hex Code Loader
15 CLEAR 59000
20 POKE 23658,0: CLS : PRINT
30 INPUT "Start Address ";a
50 IF a>61135 THEN GO TO 280
60 IF a<60000 THEN GO TO 20
70 PRINT a;
80 INPUT " :";b$
85 IF b$="END" THEN GO TO 280
90 IF LEN b$<>20 THEN GO TO 260
100 LET t=a-256*INT (a/256)
110 FOR n=0 TO 7
120 LET x$=b$(2*n+1 TO 2*n+1)
125 GO SUB 300: LET y=x
130 IF e=1 THEN GO TO 260
140 LET x$=b$(2*n+2 TO 2*n+2)
145 GO SUB 300: LET y=y*16+x
150 IF e=1 THEN GO TO 260
170 POKE a,y: LET a=a+1
180 LET t=t+y: NEXT n: LET y=0
190 FOR m=1 TO 3
200 LET x$=b$(17+m TO 17+m)
205 GO SUB 300: LET y=y*16+x
210 IF e=1 THEN LET a=a-1: GO TO 260
220 NEXT m
230 IF t=y THEN PRINT ":";b$: GO TO 50
240 PRINT "Checksum Error"
250 LET a=a-8: GO TO 50
260 PRINT "Typing Error"
270 LET a=8*INT (a/8): GO TO 50
280 SAVE "download"CODE 60000,1136
290 POKE 23658,0: STOP
300 LET e=0: LET x=CODE x$-48-7*(x$>"9")
310 IF x<0 OR x>15 THEN LET e=1
320 RETURN
```

Figure 2. Spectrum.

```
60000 :CD15EDC307ECCD15,4C7
60008 :EDCD36ECCD66EDCD,631
60016 :50EDCD47EE38FBCD,5AF
60024 :B0EDFE31CA99EAFE,69A
60032 :35CA07EAC366EACD,5D0
60040 :15ED3EFACD84EDCD,5FD
60048 :15EDC9CD15EDC366,553
60056 :EACD66ED11E5EE06,58C
60064 :003EFF121310FCCD,458
60072 :15EE11CDEE06173E,3D2
60080 :20121310FCCD1FED,3DA
60088 :30F0CD50EDCD1FED,588
60096 :30FB3265EF3E0032,3E9
60104 :6CEF326FEF3270EF,544
60112 :3A65EFCDEBEC3A65,5A1
60120 :EFE6F0FE0020DE0E,627
60128 :091165EFCD1FEDDA,501
60136 :AAEA1312CDEBEC0D,552
60144 :20F23A69EFE60020,51A
60152 :0D214B5C3A60EF0E,36C
60160 :004709226BEF0E00,1DA
60168 :11CDEECD1FED309A,47F
60176 :12130CCDEBEC79FE,45C
60184 :1020F03A60EFCDB1,447
60192 :ECCD1FEDDAAAEA21,574
60200 :6FEF0E20133E5811,326
60208 :E0EE12133E0012CD,348
60216 :D7ECCDA6ECC3AAEA,681
60224 :CD1FEDDAAAEA2170,518
60232 :EF0E20E121E5EE3A,524
60240 :60EFB56F3E000C67,3CC
60248 :3E008E2008CDD7EC,40F
60256 :3E21320B5CC3FFE8,482
60264 :3E00326FEF3270EF,3C7
60272 :ED5B60EF0E00CD1F,40C
60280 :EDDAAAEA3273EFCD,634
60288 :E0EC3A60EFFE0020,586
60296 :053A69EFE6003A73,432
60304 :EF12130C3A6AEF09,3FC
60312 :20DCCD1FEDDAAAEA,5D8
60320 :216FEF0EC22060CD,504
60328 :1FEDDAAAEA2270EF,5A2
60336 :0EC220EB3E6F32E2,509
60344 :EE3E6B32E3EE3E08,498
60352 :32E4EE3A005CFE21,581
60360 :2003CD15EECDD7EC,553
60368 :CDA6EC21E5EE3A60,5C5
60376 :EF056F3E000C6736,422
60384 :0021E5EEED4B66EF,561
60392 :0C7EFE00C28DEA23,4FC
60400 :0D20F63EFACD84ED,589
60408 :3E01D3FEC366EACD,5E8
60416 :1FED30FBC38DEAF3,594
60424 :0603AFD3FF10FB3E,308
60432 :40D3FF3EFFD3FF3E,56F
60440 :31D3FF3E0F320F5C,305
60448 :320D5C32405C3E01,250
60456 :D3FE21915CC89EFB,56B
60464 :CD50EDC366EACD15,52F
60472 :EECD66ED3E01D3FE,556
60480 :2165EE3E00CD0FEC,442
60488 :CD84ECCDA3ECCDA6,654
60496 :EC23CD77ECCD77EC,58F
60504 :CDA0ECCD84ECCDA6,661
60512 :EC233E0DCD0FECCD,4CF
60520 :84EC23CDA3EC3E03,498
60528 :CD0FECCD84ECC9CD,608
60536 :A3EC3E07CD0FECCD,561
60544 :84EC23C97EFE00C8,520
60552 :CD08ED23C384ECFE,651
60560 :00C0F53E20CD08ED,520
60568 :F130C38FECCDA0EC,65D
60576 :CDA3ECCDA6EC3E0D,5A6
60584 :CD08ED3EFF320C5C,574
60592 :C9F513E6F0CB1FCB,60C
60600 :1FCB1FCB1FF630FE,4CF
60608 :3AFAC6ECC6071213,498
60616 :F1E60FF630FE3AFA,606
60624 :D4ECC6071213C921,46C
60632 :CDEEE5CD84ECE106,69C
60640 :173E20772310FC3E,339
60648 :0077C9E52170EFAE,538
60656 :77C50E007EA7CB17,449
60664 :300D7EEE00773A6F,3C9
60672 :EFEE10326FEF3721,3D5
60680 :6FEFCB1623CB160D,358
60688 :20E2C1E1C9110501,394
60696 :216A00CD0503C93E,32F
60704 :963277EFCD47EDDA,529
60712 :2EEDF1C366EACDAC,5C8
60720 :ED7BE601F602D3FE,548
60728 :AF2177EF35200237,2FC
60736 :C9CD77ED38E8C9CD,6F0
60744 :47EED8FEC8C837C9,5E6
60752 :F5D8FF3A01EFFE00,5C7
60760 :20043E3610023E37,187
60768 :D3FFD87FF1C9F53A,675
60776 :01EFFE0020043E36,376
60784 :D3FFCD50EDF1C93E,644
60792 :00D8FFE60037C8D8,59.
60800 :FFE60237C8D8FFE6,626
60808 :302004D87FA7C93A,3E0
60816 :01EFFE0020043E37,397
60824 :10023E36D3FFD87F,452
60832 :C9CD47ED3A73EFD0,5DE
60840 :F1C366EAF53ED23D,5EE
60848 :20FDF1C9CDACED3D,62A
60856 :20FAC9C5D5E5F5FE,78D
60864 :7F2813CDF9EDFE0C,537
60872 :20BCFE0D20053E20,20A
60880 :D73E0DD718103E20,34F
60888 :D73E08D73A085CFE,4E8
60896 :2120033E00D73E5F,2E6
60904 :D73E08D7F1E1D1C1,640
60912 :C9FE07201CFEC820,4F3
60920 :19FE0C2014FE0020,380
60928 :10FE0D200CFE20FA.367
60936 :0FEEFE00FA11EE3E,48A
60944 :00C93E07C9CD6B0D,32C
60952 :3E02CD01163E1032,1C4
60960 :095CC93E121601CD,302
60968 :1122C93E121600CD,257
60976 :1122C9C5D5E53E02,3E0
60984 :CD0116CD47EE38F0,451
60992 :CD5CEEE1D1C1C93A,5CD
61000 :385CC06F200C3A00,20F
61008 :5CF5213B5CCBAEF1,4C3
61016 :A7C937C9F5111000,3DE
61024 :CD10EDF1C9444F57,4D6
61032 :4E4C4F4144494E47,284
61040 :204D454E55003120,216
61048 :2020524543454956,276
61056 :4500352020204578,217
61064 :697420746F204261,320
61072 :7369630020205573,2DF
61080 :652053796D626F6C,393
61088 :2053686966742020,388
61096 :204700746F205265,2C9
61104 :7475726E20746F20,39C
61112 :4D454E5520290045,278
61120 :4E544552204E5540,389
61128 :4245532000000000,1C1
```

SCHOOL REPORT ACT PRIZE *competition*

RESULTS

THANKS TO ACT we were able to offer some of the best prizes ever for the July competition — £2500 worth of Apricot computers. Third prize was a stock F1E, a 16-bit micro with 128K Ram and a built-in 320K Sony disc drive. The second and first prizes included a monochrome and a colour monitor.

All you had to do to enter was write a school report for your existing computer or for a personality in the home micro market, and then say what you would do with an Apricot F1E that you cannot do at the moment.

A few people missed the point and sent in reports on Arthur Scargill, James Bond, and God — "Thinks He knows it all". The rest gave us their generally rather severe verdicts on their Spectrums, BBCs, CBM 64, Vics, Orics, Ataris, Amstrads and Sir Clive Sinclair.



Many of the traditional and time-worn school report phrases — such as "tries hard", "shows no aptitude", "needs to build up his vocabulary", "unable to get through to him" — turned out to be particularly appropriate. It is only too true that the CBM 64 "needs to be poked before he gives his best performance".

And how better to describe the BBC than: "Works well but let down by poor memory"? Or take this report on Sir Clive: "Has promising ideas, but produces slipshod work which is invariably handed in late". Another apt report was G. Lea's on the Atari; the subject is Games: "An excellent term. A born games player".

The ZX-81 and the Oric received the worst reports. "Progress has been disappointing" was the most common verdict on the Oric, although one entry explained this as due to an unhappy family background. As for the ZX-81, it did badly in almost every subject.

The best anyone could say about its performance in Art was "tends towards cubism". Helen Jeffrey, 3 Raby Road, New Malden, Surrey, KT3 3QT, wins the third prize for her report on the ZX-81:

General Studies: Frail constitution leads to frequent absences and fainting fits.
Physical Sciences: Mathematical ability is good but displays a strange blinking expression when asked to work fast.
Games: Unbelievably slow. ZX's resourcefulness does not make up for lack of basic ability.
Overall: Mature student held back by failing memory, colour blindness, and baldness of the keyboard.

We awarded the second prize to T. Smith, 48 Henor Vean, Truro, Cornwall. Reporting on the Amstrad after its first year, he wrote:

Basic: Speed of a train. Others would do well to follow his example.
Software: Produces quantity but could improve quality.
Sound: Manages to envelope the whole class with noise. Well done.

The first prize goes to F. Bryant, 36 Wain-A-Long Road, Salisbury, Wiltshire, SP1 1LW, for his report on the Spectrum:

English Lanauge: Very Basic — could do better, but excellent command of syntax.
Maths: In-built ability but still makes *occasional mistakes.*
Music: Perfect pitch. Outstanding range but must project voice more.
Religious Knowledge: Has unorthodox view of religion. Worships Sir Clive.

His answer to the question about what he would do with an Apricot F1E was: "Convince my boss that we need a computer".

TOP★ TIPS

COLOUR RESTORE

I have devised a very simple routine which will restore the screen to the switch on colours when called on the Spectrum. The routine is just 11 bytes long and is called with: RANDOMIZE USR address where address is 65357 for a 48K machine or 32589 for a 16K machine.

I have located it above Ramtop and just below the UDG area, but it is relocatable anywhere in memory.

Enter the program loader and Run. The machine code can be saved with: SAVE"COLOURS" CODE (USR"a"11),11

To test the routine type BORDER 0: PAPER 0: INK 0: CLS followed by RANDOMIZE USR address Press Enter twice and the screen should show Black ink on white paper with white Border.

The routine alters the system variables BORDER and ATTR P to 56 i.e. switch on values.

Mark Robinson.

```
10 DATA 62,56,1,141,92
20 DATA 2,1,72,92,2,201
30 CLEAR (USR "a"-12)
40 FOR n=(USR "a"-11) TO (USR "a"-1)
60 READ a: POKE n,a: NEXT n
```

BORDER COLOUR

This is a short program for the CBM 64. It consists of a Basic loader which enters a small machine code program into locations 740 to 766. The code re-routes the Stop-Test vector so that when the Restore key is pressed (without Run/Stop), the border colour is increased to the one which you desire.

The Stop-Test vector also comes into action during Loading/Saving/Verifying (as well as file saving to the tape). This means that during these operations, the border flashes. You may find this useful as you can tell whether or not the computer has crashed during loading.

An interesting side effect is that whilst the computer is running a Basic program, the border also flashes.

Shaun Chapman.

```
10 FOR A=740 TO 763:READ B:POKE A,B
20 C=C+B:NEXT
30 IF C<>3171 THEN PRINT "ERROR":END
40 DATA169,239,141,40,3,169,2,141,41
50 DATA3,96,238,32,208,162,0,232,224
60 DATA13,208,251,76,237,246
70 SYS 740
```

RESPONSE *Frame*

Do you have a problem related to your micro? Tim Hartnell will do his best to help. Please include only one question per letter and mark it "Response Frame". Alternatively, perhaps you have an idea you'd like to pass on to others. Why not write to us with your top tips?

USING POINTERS

■ I own a Commodore 64 and have been programming it in Basic and have recently learned machine code. However, I cannot quite get the hang of the use of the pointers 51/52 and 55/56 to bring down the top of Ram and to move up the bottom. I know how to use the low byte/high byte system, but cannot seem to get it to do what I want. Things do not move, or things reset themselves, or Basic gets muddled. Could you please throw some light on the sub ject? Also, is it possible to get an auto-run after loading, without using Shift/Run/Stop, using these vectors? If not, how is it done?

Nick Smith,
Rossendale,
Lancashire.

AFTER LOWERING Ramtop, you need to enter a CLR. The CLR clears all variables, which cleans up the memory you wish to save. If you don't do this, some variables will still be stored above the new Ramtop. To auto-run a program, you can use the vectors hex 0300 and hex 0302. Many commercial software programs use these.

GETTING COPY

■ I have a program which gives a 40-column display on by Vic-20. I have written a program which displays tables of figures on the 40 columns screen. However, I am unable to print hard copy of the screen display on my MPS801 printer, using either the normal or an amended routine. Can you suggest a way to solve this problem?

Ross Dickinson,
Berwick-upon-Tweed,
Northumberland.

As THE Vic-20 prints out character by character — rather than pixel by pixel — when dumping to a printer, all you need is the address of the first character on the screen.

This may well be with the documentation which accompanied your program, or you might have to contact the company which wrote it.

Then you need to Peek each character in turn on the screen, and hand that information on to the printer. It should not be too difficult to write a short routine to do this.

A HEAD START

■ In the classified section of your magazine there are many advertisements for "copy tapes". I'm afraid I don't know what such things as "headerless", "headers", "false headers" and "autostart" mean. As I need to make backup copies for my Spectrum programs, I need to know which copy program can tape absolutely any program. Can you help me?

Garry Cappuccini,
Bishop's Stortford,
Hertfordshire.

NO PROTECTION-BREAKER tape can guarantee 100 per cent success, as software writers are continually trying to outwit those who break protection schemes by developing new ones. However, the more expensive of the copy tapes have a success rate in excess of 95 per cent and this should cover most of your needs.

The header on a program tape contains information — such as the location of the machine code, and its length — which is used to break copy protection, so a headerless program is one which does not so easily yield its secrets to someone wanting to break into it so it can be copied.

You do not need to know what the words mean. Just follow the copy instructions. Of course, I need hardly add that any copy tape should only be used for making backup copies of your own tapes, and not for ripping off copies from others.

IS IT A BUG?

■ I have been experimenting with the Screen 0,1 command — orange background colour — on my Dragon 32, and found a curious effect:

```
10 FOR J=1 TO 24
20 SCREEN 0,1
30 GOTO 10
```

Try to press some keys while the program is running. You can easily make variations, such as having the first loop running from 1 to 23. If you try to increase or decrease the counter, it will move faster, and Print statements between those lines will slow it down. What is happening? Is it a bug?

O Egil Roros,
Norway.

IT IS A bug of sorts, but not one which will affect your programs. I cannot imagine any situation where you are within a loop and you make a jump back to the start of that loop. It seems that the Screen 0,1 command is being asked to operate continuously, and it doesn't get enough time to complete one change before another is thrust upon it.

WHICH COMPUTER?

■ I am considering buying the Commodore 64, BBC, or the Amstrad. My main interests are programming and game playing. Which should I buy?

Paul Lyall,
Loughborough.

TWO YEARS ago I could not possibly have said, in reply to this type of question, "This is the machine you should buy". But now, with far fewer machines being launched, and manufacturers like Amstrad actually being sensible enough to ask people what they want, and then provide it, the choices are far simpler. Get an Amstrad.

Response Frame has had a number of queries regarding the production of multi-coloured, user defined graphics. Fifteen-year-old Garry Martin from Oldbury, West Midlands, has come up with an elegant solution to the problem.

There is a simple way of construction multi-coloured graphics in any mode. You do this by using the Amstrad's unique Transparent mode. Line 50 of the demonstration program does this, and line 75 switches it off. The program fills a golden-coloured goblet with red wine.

```
10 MODE 1
15 INK 0,26:INK 1,24
20 BORDER 26:INK 2,3
25 SYMBOL AFTER 254
30 SYMBOL 254,66,66,66,
   66,102,60,24,126
35 SYMBOL 255,60,60,60,
   60,24,0,0,0
40 LOCATE 20,12
45 PEN 1:PRINT
   CHR$(254)
50 PRINT
   CHR$(22)+CHR$(1)
55 FOR i=0 TO 999
60 NEXT i
70 LOCATE 20,12
80 PEN 2:PRINT
   CHR$(255)
75 PRINT
   CHR$(22)+CHR$(0)
```

MAIL ORDER PROTECTION SCHEME

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SOFTWARE *File*

Programs for Software File should be fairly compact and sent on a cassette. Please include clear instructions and say what computer it's for. We pay between £6 and £36 for programs published. They must be double-checked and submitted

Wombat Combat

D Green
Ashford,
Kent.

Spectrum

CAN YOU guide the wombat down into the underground chambers of Deep Fort to destroy the Mad Master computer lurking there? I hope so. The fate of Western Civilisation rests on your 48K Spectrum.

The game utilises an apparently unique method of registering damage, as each one of the three main systems of the wombat has its own damage monitor and is affected by different hazards. Other potential dangers on your mission include the moderately brain-dead flying robot and bouncing missiles, against which your most effective forms of defence are either running away or using your unbelievably short range tactical nuclear weapons, activated by key 0. Use the arrow keys to move, or change them in lines 160 and 170.

Since the actual destruction of the master computer is not really all that hard, to get a reasonable score of over 2000 points you also need to collect all of the batteries that are lying around by some improbable coincidence. These batteries and various other objects have somehow been granted the power of levitation and hover in the air. The wombat is susceptible to falling if there is nothing to support it.

The program is a good example of sound effects overkill, since hardly anything ever happens in total silence. The five mindless tunes embedded in the game are all done from Basic, but to show that the Spectrum can do more than beep, two machine-code routines are used. If you want to experiment with these, then have a look at line 2790, which sets up the variables to be used as follows:

Poke lf, low (least significant) byte of frequency
Poke hf, high (most significant) byte of frequency
Poke len, number of beeps to be made
Poke bep, length of each beep

Then use Usr urun for a sound effect that goes up in pitch, or Usr drun for a sound effect which goes down in pitch. Be very careful when using numerically low frequencies, as if an uprunning sound effect goes into negative frequency values then a boring breakproof beep will occupy your computer for anything up to several hours.

The amazingly efficient language of machine code is also used to detect user-defined graphics and to move the missiles. Note that all this machine code means that multiple saves before running are essential, as checksums can't find all your errors and just one wrong poke can send all 16K of program to that great Ram chip in the sky.

```
  50 REM
Graphics:
▒=a,▒=b,<=c,>=d,▒=e,▒=f,#=g,¥=h,
▒=i,▒=j,ƒ=k,▒=l,▒=m,▒=n,▒=o,▒=p,
▒=q,▒=r,▒=s,▒=t,▒=u.

Version:2091216(?!) © DG 84
  60 RUN 2410
  70 FOR n=0 TO .05 STEP .001: B
EEP n,n: NEXT n: FOR n=.05 TO 0
STEP -.001: BEEP n,n: NEXT n: RE
M thanks simon !!!
  80 DIM d(3): LET sc=0: LET min
=10
  90 GO SUB 1680
 100 LET x=6: LET y=8: LET ay=8
 110 LET ax=25
 120 POKE hf,1: POKE len,20: POK
E bep,2: FOR n=5 TO 1 STEP -1: P
OKE lf,50+n: LET zz=USR urun: NE
XT n
 130 LET l$=" "
 140 REM game loop
 150 LET lx=x: LET ly=y
 160 LET x=x+(INKEY$="8")-(INKEY
$="5"): IF INKEY$="7" THEN BEEP
.001,20: LET y=y-1: GO TO 190
 170 IF INKEY$="6" THEN LET y=y+
1: GO TO 200
 180 PRINT AT y+1,x;: LET z$=CHR
$ USR 60057: IF z$<>"#" AND z$<>
"▒" THEN LET y=y+1
 190 IF y<=0 THEN LET y=0
 200 PRINT AT ly,lx;l$: LET l$=S
CREEN$ (y,x): IF l$<>" " THEN GO
 TO 590
 210 PRINT AT y,x; BRIGHT 1;"▒"
 220 IF INKEY$="0" THEN GO TO 37
0
 230 IF y=18 THEN GO TO 350
 240 GO TO 250+(10 AND RND>.5)
 250 LET au=(ax<x)-(ax>x): LET a
v=0: GO TO 270
 260 LET av=(ay<y)-(ay>y): LET a
u=0
 270 LET ax=ax+au: LET ay=ay+av
 280 PRINT AT ay-av,ax-au;" ";AT
 ay,ax;: LET z$=CHR$ USR 60057
 290 IF z$="▒" THEN LET al=2: GO
 TO 720
 300 IF z$<>" " AND RND>.2 THEN
LET ax=ax-au: LET ay=ay-av: PRIN
T AT ay,ax;
 310 PRINT "▒"
 320 IF USR 60248 THEN LET al=1:
 GO TO 720
 330 GO TO 150
 340 REM next screen
 350 GO SUB 2340: PRINT AT 19,x;
"▒": LET lv=lv+13+(6 AND lv<>6):
 GO SUB 1710: LET y=0: LET ay=0:
 GO TO 110
 360 REM TNW activated
 370 IF min=0 THEN BEEP .005,40:
 GO TO 230
 380 LET min=min-1: PRINT AT 20,
24; PAPER 1;min;" "
 390 PRINT AT y-1,x-1; OVER 1;"█
██";AT y,x-1;"███"
 400 POKE lf,50: POKE hf,1: POKE
 len,20: POKE bep,3: LET zz=USR
urun+USR drun
 410 PRINT AT y-1,x-1; OVER 1;"█
██";AT y,x-1;"███"
 420 DIM g$(2,3)
 430 LET kil=0
 440 FOR n=-1 TO 0: FOR m=-1 TO
1
 450 PRINT AT y+n,x+m;: LET z$=C
HR$ USR 60057
 460 IF z$=" " THEN GO TO 520
 470 IF z$="▒" OR z$="▒" OR z$="
▒" OR z$="▒" THEN LET g$(n+2,m+2
)=z$: GO TO 520
 480 IF z$="▒" THEN LET ax=25: L
ET ay=8: LET sc=sc+50
 490 IF z$="¥" OR z$="ƒ" OR z$="
▒" THEN LET sc=sc+10
 500 IF z$="<" OR z$=">" THEN PO
KE 64000,6: POKE 64001,1: LET sc
=sc+25
 510 IF z$="▒" THEN LET kil=1
 520 NEXT m: NEXT n
 530 PRINT AT 19,24; PAPER 1;sc
 540 LET g$(2,2)="▒"
 550 PRINT AT y-1,x-1;g$(1);AT y
,x-1;g$(2): LET zz=USR drun
 560 IF kil THEN GO TO 1090
 570 GO TO 230
 580 REM wom collision detected
 590 PRINT AT y,x;: LET z$=CHR$
USR 60057: IF z$="▒" THEN GO TO
210
 600 IF z$="▒" THEN LET l$=z$: G
O TO 210
 610 IF z$>="▒" AND z$<="▒" THEN
 GO TO 620
 620 IF z$="¥" OR z$="ƒ" OR z$="
▒" THEN GO TO 660
 630 IF z$="▒" THEN LET sc=sc+10
: POKE lf,120: POKE hf,1: POKE l
en,50: POKE bep,1: LET zz=USR dr
un: PRINT AT 19,24; PAPER 1;sc:
LET l$=" ": GO TO 210
 640 LET l$=" ": LET x=lx: LET y
=ly: GO TO 210
 650 REM damage on 1
 660 POKE len,20: POKE bep,1: FO
R n=1 TO 3: POKE lf,200: POKE hf
,0: LET zz=USR urun: NEXT n
 670 LET d=(z$<="ƒ")+(z$="¥")+(3
 AND z$="▒")
 680 LET d(d)=d(d)+1: PRINT AT 1
8+d,5+d(d); PAPER 8;">"
 690 IF d(d)=10 THEN PRINT AT ly
,lx;" ": GO TO 880
 700 LET l$=" ": GO TO 210
 710 REM damage on 3
 720 POKE len,10: POKE bep,4: PO
KE lf,200: POKE hf,0
 730 PRINT AT y,x; INK 2; FLASH
1;"▒"
 740 FOR n=1 TO 3: LET d(n)=d(n)
+1
 750 PRINT AT 18+n,5+d(n); PAPER
 8;">"
 760 IF d(n)=10 THEN GO TO 880
 770 LET zz=USR drun: NEXT n
 780 LET l$=" ": IF al=2 THEN LE
T ax=25: LET ay=8: GO TO 320
 790 IF RND>.5 THEN POKE 64000,6
: POKE 64001,1: GO TO 150
 800 POKE 64000,25: POKE 64001,-
1: GO TO 150
 810 REM repairs
 820 LET d=CODE z$-CODE "▒"
 830 IF d(d)=0 THEN BEEP .01,20:
 GO TO 860
 840 POKE lf,100: POKE hf,2: POK
E len,20: POKE bep,2: LET zz=USR
 urun+USR drun
 850 PRINT AT 18+d,5+d(d); PAPER
 8;".": LET d(d)=d(d)-1
 860 LET l$=" ": GO TO 210
 870 REM explosion
 880 LET lin=ABS (y-21): IF x<li
n THEN LET lin=x
 890 POKE hf,10: POKE len,5: POK
E bep,1
 900 LET col=ABS (x-31): IF y<co
l THEN LET col=y
 910 IF col<lin THEN LET lin=col
 920 PRINT AT y,x;" ": PAPER 8
 930 FOR n=0 TO lin: PRINT AT y+
n,x+n; OVER 1;"▪";AT y+n,x-n;"▪"
;AT y-n,x+n;"▪";AT y-n,x-n;"▪"
 940 POKE lf,n+20: LET zz=USR dr
un
 950 BORDER RND*7
 960 PRINT AT y+n,x+n; OVER 1;"▪
";AT y+n,x-n;"▪";AT y-n,x+n;"▪";
AT y-n,x-n;"▪"
 970 NEXT n
 980 BORDER 0
 990 PAPER 0
1000 POKE len,150: POKE bep,2: L
ET zz=USR drun
1010 GO SUB 2000
1020 GO SUB 1330: GO SUB 1340
1030 DATA "it had severe brain d
amage","its hydraulics system fa
iled","its motor system exploded
"
1040 RESTORE 1030: PRINT ;'"The
Wombat was destroyed because": F
OR n=1 TO 3: READ z$: IF d(n)=10
 THEN GO TO 1060
1050 NEXT n
1060 PRINT z$;"."
1070 PRINT '"Score:";sc
1080 GO TO 1250
1090 REM computer destroyed
1100 POKE hf,2: POKE lf,100: POK
E len,20: POKE bep,1: FOR n=1 TO
 25: BORDER RND*7: LET zz=USR dr
un+USR urun: NEXT n
1110 GO SUB 1680
1120 POKE hf,3: FOR n=5 TO 10: P
OKE lf,n*20: GO SUB 1320: LET zz
=USR urun: NEXT n: POKE len,100:
 POKE bep,2: LET zz=USR drun
1130 BEEP .1,0
1140 LET z$="
```

(continued on next page)

(continued from previous page)

```
1150 PRINT AT 4,0; INVERSE 1;z$;
"    "; FLASH 1;"1000 Point bo
nus !!!"; FLASH 0;"    ";z$
1160 FOR n=1 TO 10: BEEP .1,32:
LET sc=sc+100: PRINT AT 19,24; P
APER 1;sc: NEXT n
1170 PRINT AT 8,0; INVERSE 1;z$;
"  "; FLASH 1;"Computer destr
oyed !!!"; FLASH 0;"    ";z$
1180 GO SUB 2320
1190 PRINT AT 12,0; INVERSE 1;z$
;"   "; FLASH 1;"MISSION SUC
CESSFUL"; FLASH 0;"    ";z$
1200 POKE hf,3: POKE lf,0: POKE
len,0: POKE bep,20: LET zz=USR u
run+USR drun
1210 GO SUB 1320: FOR n=1 TO 4:
BEEP .1,2: BEEP .05,-10: BEEP .1
,4: BEEP .05,-6: NEXT n: BEEP .1
,2: BEEP .05,-10: BEEP .8,4: BEE
P .05,-6
1220 GO SUB 1330: CLS : PRINT BR
IGHT 1;"You did it !"
1230 PRINT ''"Score:";sc
1240 REM endgame
1250 LET z$=STR$ sc: LET z$="000
0000"( TO 7-LEN z$)+z$
1260 FOR n=1 TO 8: IF z$>s$(n) T
HEN GO TO 1280
1270 NEXT n: GO SUB 1330: GO SUB
 1330: GO TO 3030
1280 PRINT ''"Please enter your n
ame for the  hall of fame(max.13
 letters)."
1290 FOR b=8 TO n+1 STEP -1: LET
 s$(b)=s$(b-1): LET n$(b)=n$(b-1
): NEXT b: INPUT n$(n)
1300 LET s$(n)=z$
1310 GO TO 3030
1320 FOR m=1 TO 10: NEXT m: RETU
RN
1330 FOR m=1 TO 100: NEXT m: RET
URN
1340 BORDER 0: PAPER 0: INK 7: C
LS : RETURN
1350 REM status print
1360 PAPER 1
1370 FOR n=1 TO 3: BEEP .01,n/2:
 PRINT AT 18+n,0;"
                 ": NEXT n
1380 DATA "Neuro","Hydra","Motor
","Scoresc","TNW'smin","Level1+I
NT (lv/18)"
1390 RESTORE 1380: FOR n=1 TO 3:
 READ z$: PRINT AT 18+n,0;z$;":.
......"; PAPER 2;"...": IF d(n)=
0 THEN GO TO 1410
1400 PRINT AT 18+n,6; PAPER 8;">
>>>>>>>>>"( TO d(n)): BEEP .01,n
+20
1410 NEXT n
1420 FOR n=1 TO 3: READ z$: PRIN
T AT 18+n,18;z$( TO 5);":";VAL z
$(6 TO ): NEXT n
1430 PAPER 0
1440 RETURN
1450 DIM a$(3040)
1460 CLS : PRINT "Please wait fo
r several seconds while the new
layout is set up..."
1470 LET b$="▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒
▒▒"
1480 LET a$(198 TO 220)=b$: LET
a$(230 TO 252)=b$
1490 FOR n=262 TO 2918 STEP 32:
LET a$(n)="▒": LET a$(n+21)="▒":
 NEXT n
1500 LET a$(2950 TO )="▒▒▒▒▒▒▒▒▒
▒▒▒▒▒▒▒▒▒▒▒▒": FOR n=1 TO 2: LE
T a$(2950+n*32 TO )=b$: NEXT n
1510 LET a$(1693 TO 1696)="DEEP"
: LET a$(1725 TO 1728)="FORT": L
ET a$(1756 TO 1759)="▌▐"
1520 PRINT "Walls completed": BE
EP .2,0
1530 FOR n=9 TO 90 STEP 3
1540 FOR m=1 TO 2
1550 LET a=INT (RND*11)+7: LET p
os=32*n+a
1560 LET a$(pos TO pos+INT (RND*
6)+4)="▒▒▒▒▒▒▒▒▒▒"
1570 NEXT m
1580 NEXT n
1590 PRINT "Platforms completed"
: BEEP .2,4
1600 FOR n=8 TO 27 STEP 4
1610 FOR k=1 TO 10
1620 LET a=INT (RND*70)+10: LET
l=INT (RND*6)+5
1630 LET pos=32*a+n: FOR m=pos T
O pos+32*l STEP 32: LET a$(m)="H
": NEXT m
1640 NEXT k
1650 NEXT n
1660 PRINT "Ladders completed":
BEEP .4,7
1670 RETURN
1680 BORDER 5: PAPER 5: LET lv=6
: FOR n=1 TO 5: LET zz=USR 3280:
 PRINT AT 18,0;"
                  ": NEXT n
1690 POKE lf,1: POKE hf,2: POKE
len,20: POKE bep,1
1700 LET zz=USR 3280: PRINT AT 1
8,0;"    ": LET z$="▒ ▒ ▒ ▒ ▒ ▒
▒ ▒ ▒ ▒ ▒ ▒": FOR n=1 TO LEN z$
: LET zz=USR drun: PRINT PAPER 5
 AND z$(n)=" ";z$(n);: NEXT n: P
RINT
1710 PAPER 5: FOR n=lv TO 94: LE
T zz=USR 3280
1720 IF n=57 THEN BORDER 0
1730 IF n=55 THEN PAPER 4
1740 IF n=57 OR n=76 THEN PAPER
0
1750 LET q=n*32+1: PRINT AT 18,0
;a$(q TO q+4); PAPER 0;a$(q+5 TO
 q+26): PRINT AT 18,27; INK 0;a$
(q+27 TO q+31)
1760 IF n>7 AND n<92 THEN FOR m=
1 TO 3: PRINT AT 18,INT (RND*20)
+6; INK 6; PAPER 0;"¥%¢"(INT (RN
D*3+1)): NEXT m: IF RND>.7 THEN
PRINT AT 18,INT (RND*20)+6; INK
4; PAPER 0;CHR$ (162+INT (RND*3)
)
1770 BEEP .005,40-(n/2): PRINT A
T 21,0; PAPER 2;">>>>>>>>>>>>Goin
g down<<<<<<<<<<<"
1780 IF (n+1)/19=INT ((n+1)/19)
THEN GO TO 1800
1790 NEXT n
1800 PAPER 0
1810 LET ml=INT (RND*6)+8
1820 PRINT AT ml,5;"▒";AT ml,26;
"▒": POKE 60004,ml: POKE 64000,2
5: POKE 64001,255
1830 LET lr=8+(8 AND lv<>6)
1840 FOR n=0 TO RND*10+20: PRINT
 AT INT (RND*lr)+(8 AND lv=6),IN
T (RND*20)+6; INK 3;"▒": BEEP .0
1,55: NEXT n
1850 IF lv=76 THEN PRINT AT 14,2
4; FLASH 1;"▒▒";AT 15,24;"▒▒": P
OKE lf,1: POKE hf,6: POKE len,20
0: POKE bep,1: LET zz=USR urun+U
SR drun: PRINT AT 14,24;"▒▒";AT
15,24;"▒▒"
1860 GO SUB 1350
1870 RETURN
1880 REM toccata tune
1890 DATA -3,2,4,5,2,4,5,7,4,5,7
,9,5,7,9,10,7
1900 DATA 9,5,7,4,5,2,4,1
1910 DATA 2,2,2,2
1920 RESTORE 1890
1930 FOR n=1 TO 29
1940 READ a
1950 BEEP .08,a
1960 NEXT n
1970 RETURN
1980 REM end tune
1990 DATA 4,4,2,-1,2,0,-1
2000 RESTORE 1990
2010 FOR n=1 TO 7
2020 READ a
2030 BEEP .2,a
2040 NEXT n
2050 BEEP .4,-3
2060 RETURN
2070 REM allegro tune
2080 DATA 0,12,16,7,12,16
2090 DATA 0,12,16,7,12,16: REM
     just edit line 2080
2100 DATA 2,11,17,7,11,17
2110 DATA 2,11,17,7,11,17
2120 DATA -5,11,17,7,11,17
2130 DATA -5,11,17,7,11,17
2140 DATA 0,12,16,7,12,16
2150 DATA 0,12,16,7,12,16
2160 DATA -3,12,16,9,12,16
2170 DATA -3,12,16,9,12,16
2180 DATA 2,14,17,9,14,17
2190 DATA 2,14,17,9,14,17
2200 DATA -5,12,16,7,12,16
2210 DATA -5,11,17,7,11,17: REM
     Different to 2200 !!!
2220 DATA 0,12,16,7,12,16
2230 RESTORE 2080
2240 FOR n=1 TO 90
2250 READ a
2260 BEEP .1,a-24
2270 BEEP .1,a-12
2280 IF INKEY$<>"" THEN RETURN
2290 NEXT n
2300 BEEP .1,-24: BEEP .4,-12
2310 RETURN
2320 REM sonata tune
2330 DATA -1,4,7,-1,4,7,0,4,7,0,
5,9,-1,4,6,-1,3,6
2340 RESTORE 2330
2350 FOR n=1 TO 6
2360 READ a,b,c: BEEP .05,a
2370 FOR m=1 TO 3: BEEP .05,b: B
EEP .05,c: NEXT m: BEEP .05,b
2380 NEXT n
2390 FOR n=1 TO 3: BEEP .05,4: N
EXT n
2400 RETURN
2410 BORDER 0: INK 7: PAPER 0: C
LEAR 59999
2420 PRINT AT 1,1; BRIGHT 1;"
WOMBAT"
2430 PRINT AT 4,1; BRIGHT 1;"
COMBAT"
2440 PRINT AT 9,1; INK 6;"Design
 and software by D.Green"
2450 PRINT AT 11,0; INK 3;"© 198
4 "; INK 7;"HIGH
TECH"
2460 PRINT AT 17,12; INK 5;"soft
ware"
2470 PRINT AT 19,9; INK 2;"Pleas
e wait..."
2480 REM graphics
2490 DATA 60,195,255,189,a,a,36,
102,0,60,36,126,255,126,231,165
2500 DATA 0,a,6,124,a,6,0,a,a,a,
96,62,a,96,0,a
2510 DATA 0,60,102,66,102,126,66
,126,66,126,66,a,a,126,66,a
2520 DATA 255,66,255,66,66,0,a,a
,129,66,36,153,90,60,24,126
2530 DATA 231,240,231,15,231,240
,231,15,231,15,231,240,231,15,23
1,240
2540 DATA 4,8,16,60,8,16,32,0,a,
102,66,231,129,66,36,24
2550 DATA 248,a,206,242,a,206,24
8,a,31,a,115,79,a,115,31,a
2560 DATA 0,127,65,127,82,127,64
,66,0,254,18,254,74,254,2,146
2570 DATA 73,82,64,127,112,97,a,
115,34,74,2,254,26,10,a,158
2580 DATA 173,33,174,169,227,170
,139,251,0,a,a,a,204,50,30,a
2590 DATA 0,a,a,a,a,195,126,195
2600 RESTORE 2490
2610 FOR n=USR "a" TO USR "u"+7:
 READ a
2620 POKE n,a: NEXT n
2630 REM tremble with fear-
        machine code is here !
2640 LET loc=60000
2650 DATA 592443,"01020a01002a60
ea3a62ea473a63ea5f1600c9cd65eac5
d5e5cdb503e1d1c12310f42260eac9cd
65eac5d5e5cdb503e1d1c12b10f42260
eac92a645ced5b7b5c"
2660 DATA 436172,"06150e00c5e5d5
00091abe200e132410f806003e90614f
e1e1e1c9d1210600019ebe1c10c10de06
000e20c921004078e610b46779e61f6f
78e607cb27cb27cb27"
2670 DATA 454379,"cb27cb27b56fc9
3a64ea473a00fa4fcdcbeac506063600
2410fbc13a01fa814fcdcbea22645cc5
cd99ea79c1fe9020040101000c979fe1a
200c0e193eff3201fa"
2680 DATA 530193,"cdcbea180efe05
200a0e063e013201facdcbea45ed5b7b
5c2110003a01fafe0120032118001 9eb
e106081a77132410fa793200fa010000
c90605c5cde7ea79c1b7200610f50100
00c9010100c9"
2690 PRINT AT 21,14;"0000"
2700 FOR m=1 TO 4
2710 READ chk,a$: LET sum=0
2720 FOR n=1 TO LEN a$ STEP 2
2730 LET dc=16*(CODE a$(n)-48-(3
9 AND a$(n)>="a"))+CODE a$(n+1)-
48-(39 AND a$(n+1)>="a")
2740 POKE loc,dc: LET sum=sum+dc
*n: LET loc=loc+1
2750 NEXT n
2760 PRINT AT 21,13+m;"X": BEEP
.01,0
2770 IF sum<>chk THEN PRINT AT 2
0,0;"Error in line ";2640+10*m;z
xy
2780 NEXT m
2790 LET lf=60000: LET hf=60001:
 LET len=60002: LET bep=60003: L
ET drun=60019: LET urun=60038
2800 FOR n=1 TO 18: LET zz=USR d
run+USR urun: NEXT n
2810 POKE len,0: LET zz=USR drun
+USR drun+USR drun
2820 PRINT AT 21,2; FLASH 1;"Pre
ss any key to continue...": PAUS
E 0
2830 CLS : PRINT BRIGHT 1;TAB 9;
"WOMBAT  COMBAT";AT 0,9; OVER 1;
"______________"
2840 PRINT ''"Control the"
2850 DATA "Weapons","Orientated"
,"Mechanised","Biotronic","Armou
r","Technology"
2860 RESTORE 2850: FOR n=1 TO 6:
 READ z$: PRINT AT n+2,12; PAPER
 2;z$(1); PAPER 0;z$(2 TO ): BEE
P .1,n: NEXT n
2870 PRINT "Using the cursor key
s 5,6,7,8,todestroy the evil com
puter hidingin the depths of Dee
p Fort."
2880 PRINT '"Eliminate obstacles
 using your  Tactical Nuclear We
apons(key 0).You only have ten o
f these,and  will need at least
2 to destroy the main computer."
2890 PRINT AT 21,2; FLASH 1;"Pre
ss any key to continue...": GO S
UB 2230: PAUSE 0
2900 CLS : PRINT BRIGHT 1;"Score
 table:"
2910 DATA "▒",50,"*",25,"+",10,"
▒",sn,"▒",sn
2910 PRINT '"Destroy:": RESTORE
2910: FOR n=1 TO 5: BEEP .05,n:
READ z$,sn: PRINT AT n+1,10;z$;"
.....";sn;" points": NEXT n
2930 PRINT TAB 9;"▒▒"'TAB 9;"▒▒.
....1000 points"
2940 PRINT '"(Pick up ▒'s for 10
 points each)"
2950 PRINT '"Each Wombat system
has its own  damage and repair u
nits:"
2960 PRINT '"System:        Damage
d by  Repair "
2970 DATA "Electronics","*▒","Hy
draulics","▒▒","Servomotors","▒▒
"
2980 RESTORE 2970: FOR n=1 TO 3:
 BEEP .1,n/3: READ z$,y$: PRINT
AT 15+n,0;z$;AT 15+n,18;y$(1);AT
 15+n,26;y$(2): NEXT n
2990 PRINT AT 21,2; FLASH 1;"Pre
ss any key to continue...": GO S
UB 1920: PAUSE 0
3000 DIM s$(8,7): DIM n$(8,13):
FOR n=1 TO 8: LET s$(n)="0000000
": LET n$(n)="  High Tech": NEXT
 n
3010 LET a$=""
3020 REM high score table
3030 GO SUB 1340: PRINT TAB 5; B
RIGHT 1;"> High Scores <"'': FOR
 n=1 TO 8: PRINT "*** ";s$(n);".
....";n$(n);"***"'': BEEP .1,n/2
: NEXT n
3040 PRINT AT 20,2; FLASH 1;"Pre
ss key 1 for a new layout";AT 21
,2;" or any other key to play
": GO SUB 2230: PAUSE 0
3050 IF INKEY$="1" OR a$="" THEN
 GO SUB 1450
3060 GO TO 70
```

Santa's Night of Work

Quenton Barker, Letchworth, Hertfordshire.

CBM-64

SANTA'S NIGHT OF WORK is a short but fast game for the Commodore 64. It employs a machine-code section to control sprite movement, under joystick control — port 2. The sprite data is used to construct the windows and Santa's sleigh and reindeer. The object of the game is to collect a present and deposit it down one of the chimneys, which window is flashing.

If a window turns yellow Santa dies, and the game must be re-started by pressing any key. A running score is kept, and a high-score feature is included. The game sounds easy enough, but it is furiously frustrating as more and more windows begin to flash, the instructions are included within the program. Once typed in the game should first be Saved, and then tested.

The machine code takes about 12 seconds to Read, and Poked into memory. Once this is done the instructions are displayed and the game speed and level maybe entered. Just type in the program as it is seen and Save it in the normal way.

```
0 GOSUB1500
1 GOSUB250:POKE53248+33,1:PRINT"▒▒":SC=0
2 POKE54296,15
5 C$="▒▒▒▒▒▒▒▒▒▒"
6 B$="▒▒ ▒▒ ▒▒ "
7 D$="▒▒▒ ▒▒▒▒▒"
10 POKE53248+33,0:POKE53248+32,0
20 PRINT"▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒":FORI=1TO2
30 PRINT"▒▒ ▒"B$"▒    "B$"▒▒▒▒"B$"▒▒▒▒"B$"▒▒▒▒"B$"
31 NEXT
50 PRINTD$D$D$D$D$
60 PRINT"▒"C$C$C$C$C$"▒────────"
70 A$="▒ ╲ ╲ ╲ ╲ ╲ ╲ ╲ ╲ ╲ ╲ ╲ ╲ ╲ ╲ ╲ ╲ "
80 PRINT"▒"A$
90 PRINT"▒"A$
100 PRINT"▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒"
120 A=53248:POKEA+23,248:POKEA+27,255
121 FORI=0TO16:POKEA+I,0:NEXT
130 POKEA,230:POKEA+1,100:POKE2040,220
140 POKEA+21,255
150 POKEA+28,255:POKEA+39,4:POKEA+38,11
151 POKEA+37,1
```

```
155 POKE832,0:POKE2042,223
160 POKEA+2,255:POKEA+3,100:POKE2041,221
161 PRINT""TAB(30)"HISC"
162 PRINT""TAB(30)HI
170 POKEA+40,8
180 FORI=6TO14STEP2:POKEA+I,-103+(I*24)
181 POKEA+I+1,208:NEXT
190 FORI=3TO7:POKE2040+I,224:POKEA+39+I,0:NEXT
191 PRINT""TAB(30)"SCORE"
200 FORI=0TO10STEP2:B=4*256+(81*I)
201 POKE834+I,B/256
202 POKE833+I,B-(PEEK(834+I)*256)
203 NEXT
205 POKE830,BE:POKE831,1:POKE832,0
210 SYS49388
211 IFPEEK(829)=0THEN GOTO 3999
212 PRINT"DEAD!"
213 POKE54276,0:POKE54277,255
214 POKE54273,10:POKE54276,129
220 GETA$:IFA$=""THEN220
230 IFSC>HITHENHI=SC
240 GOTO1
250 PRINT"            'SANTA'S DAY OF WORK'"
251 POKE53248+21,0
253 POKE53248+33,0:POKE53248+32,0
254 PRINT"                BY Q.D.BARKER"
260 PRINT"YOU ARE SANTA"
270 PRINT"DELIVERING PRESENTS TO THE KIDS BUT
280 PRINT"THEY BECOME VERY ANGRY AND "
290 PRINT"IF THEY DON'T GET WHAT THEY WANT, YOU
300 PRINT"DIE. TO INDICATE HOW MAD THEY ARE
302 PRINT"THE LIGHTS WILL CHANGE COLOUR.
310 PRINT"YELLOW MEANS DEATH."
315 PRINT"COLLECT A PRESENT AND LET A SNOWFLAKE
316 PRINT"KNOCK IT DOWN THE RIGHT CHIMNEY."
320 INPUT"SPEED(1-3)";LE
330 BE=0
340 IFLE=2THENBE=4
350 IFLE=3THENBE=8
351 INPUT"LEVEL(1-3)";LE
352 LS=2
353 IFLA=2THENLS=3
354 IFLA=3THENLS=6
356 POKE49457,LS
360 RETURN
999 REM CODE (M/C)
1000 DATA162,0,189,65,3,133,250,189
1001 DATA66,3,133,251,165,251,201,4
1002 DATA144,48,201,6,176,44,76,89
1003 DATA192,234,145,250,189,65,3,24
1004 DATA105,40,157,65,3,189,66,3
1005 DATA105,0,157,66,3,189,65,3
1006 DATA133,250,189,66,3,76,102,192
1007 DATA234,145,250,232,232,224,10,144
1008 DATA193,96,169,4,157,66,3,138
1009 DATA10,157,65,3,134,253,24,101
1010 DATA253,105,3,157,65,3,76,45
1011 DATA192,160,0,177,250,201,42,208
1012 DATA187,169,32,76,26,192,133,251
1013 DATA177,250,201,32,208,205,169,42
1014 DATA76,57,192,173,0,220,41,1
1015 DATA208,13,173,1,208,201,50,144
1016 DATA6,206,1,208,206,1,208,173
1017 DATA0,220,41,2,208,13,173,1
1018 DATA208,201,130,176,6,238,1,208
1019 DATA238,1,208,173,0,220,41,4
1020 DATA208,13,173,0,208,201,20,144
1021 DATA6,206,0,208,206,0,208,173
1022 DATA0,220,41,8,208,13,173,0
1023 DATA208,201,230,176,6,238,0,208
1024 DATA238,0,208,173,1,208,141,3
1025 DATA208,173,0,208,24,105,24,141
1026 DATA2,208,173,64,3,201,0,208
1027 DATA18,173,0,208,24,105,2,141
1028 DATA4,208,173,1,208,24,105,1
1029 DATA141,5,208,96,173,18,208,201
1030 DATA160,208,249,238,63,3,173,63
1031 DATA3,205,62,3,144,238,32,115
1032 DATA192,32,115,192,32,0,192,169
1033 DATA0,141,63,3,32,42,193,32
1034 DATA6,194,76,61,193,174,5,220
1035 DATA224,5,176,12,189,42,208,201
1036 DATA240,208,0,169,7,254,42,208
1037 DATA96,0,238,41,193,173,41,193
1038 DATA201,2,144,8,169,0,141,41
1039 DATA193,76,21,193,96,162,0,189
1040 DATA42,208,201,247,208,6,169,1
1041 DATA141,61,3,96,232,224,5,208
1042 DATA238,234,234,234,173,0,208,74
1043 DATA74,74,133,252,169,3,133,253
1044 DATA173,1,208,74,74,74,170,165
1045 DATA252,24,105,40,133,252,165,253
1046 DATA105,0,133,253,202,224,255,208
1047 DATA238,160,15,177,252,201,42,208
1048 DATA10,173,64,3,201,0,208,3
1049 DATA238,64,3,76,220,193,208,46
1050 DATA173,5,208,24,105,8,141,5
1051 DATA208,201,150,144,33,160,0,173
1052 DATA4,208,201,70,144,16,200,201
1053 DATA110,144,11,200,201,160,144,6
1054 DATA200,201,190,144,1,200,169,2
1055 DATA141,64,3,76,193,193,76,228
1056 DATA193,185,42,208,201,240,240,9
1057 DATA185,42,208,56,233,1,153,42
1058 DATA208,169,60,141,4,208,141,5
1059 DATA208,76,0,194,173,64,3,201
1060 DATA1,76,142,193,173,64,3,201
1061 DATA2,208,15,173,30,208,201,5
1062 DATA208,5,169,0,141,64,3,76
1063 DATA236,192,173,30,208,76,236,192
1064 DATA169,0,141,61,3,96,173,63
1065 DATA3,208,15,238,249,7,173,249
1066 DATA7,201,223,144,5,169,221,141
1067 DATA249,7,96,0,0,0,0,0
1500 REM CODE / SPRITE LOADER
1501 FORI=0TO543:READA:POKE49152+I,A:NEXT
1502 FORI=0TO330:READA:POKE14080+I,A:NEXT
1999 REM SPRITE DATA
2000 DATA0,0,0,0,0,0,64,0
2001 DATA0,32,0,0,40,0,0,20
2002 DATA0,0,20,0,0,60,0,0
2003 DATA40,0,0,42,144,0,42,149
2004 DATA0,42,0,0,85,64,0,255
2005 DATA160,0,255,160,0,255,160,4
2006 DATA255,252,4,85,85,80,0,0
2007 DATA0,0,0,0,0,0,0,0
2008 DATA0,0,0,0,0,0,0,0
2009 DATA0,0,0,0,0,0,0,0
2010 DATA0,0,0,0,0,0,0,0
2011 DATA0,0,0,0,2,0,0,0
2012 DATA128,0,0,40,32,0,170,40
2013 DATA42,162,2,170,160,10,170,160
2014 DATA40,0,160,32,0,40,128,0
2015 DATA8,0,0,0,0,0,0,0
2016 DATA0,0,0,0,0,0,0,0
2017 DATA0,0,0,0,0,0,0,0
2018 DATA0,0,0,0,0,0,0,0
2019 DATA0,0,0,0,2,0,0,0
2020 DATA128,0,0,40,32,0,170,40
2021 DATA40,162,2,170,160,10,170,160
2022 DATA10,0,160,2,130,128,0,138
2023 DATA0,0,0,0,0,0,0,0
2024 DATA0,0,0,0,2,128,0,10
2025 DATA160,0,26,172,0,166,184,2
2026 DATA169,232,14,169,100,11,174,88
2027 DATA6,250,104,9,185,96,10,118
2028 DATA64,2,154,0,0,184,0,0
2029 DATA48,0,0,0,0,0,0,0
2030 DATA0,0,0,0,0,0,0,0
2031 DATA0,0,0,0,0,0,0,0
2032 DATA170,186,171,170,186,171,170,186
2033 DATA171,170,186,171,170,186,171,170
2034 DATA186,171,170,186,171,170,186,171
2035 DATA170,122,167,85,117,87,255,255
2036 DATA255,170,186,171,170,186,171,170
2037 DATA186,171,170,186,171,170,186,171
2038 DATA170,186,171,170,186,171,170,186
2039 DATA171,170,122,167,85,117,87,0
2040 DATA0,0,0,0,0,0,0,0,0,0
3000 RETURN
3999 SC=SC+100:PRINT""TAB(30)SC
4000 POKE54276,0:POKE54277,7:POKE54273,
     100:POKE54276,17
4100 GOTO210

READY.
```

Blue Meanies

Jonathan Bowring,
Caerphilly,
Mid-Glamorgan.

BLUE MEANIES IS written entirely in machine code and takes up just over 3.5K of memory. It is listed as a hex dump, with line numbers for easy reference and a simple checksum to prevent most errors. The hex should be typed in using the loader program provided — or any other loader for that matter.

Type in the loader program and save it to Microdrive. Then LRun it to enter the hexadecimal digits. You will first be prompted for the number of bytes you are typing in. For this game you should enter the number 3800.

Now you can enter the code line by line. You don't have to enter the lines in numerical order, but it helps to prevent you missing out lines accidentally. This feature allows you to save the file and then edit it or add to it at a later date.

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First type the line number as given in the listing. Press Enter. You must now enter the four eight-digit hex numbers given with that line number, pressing Enter after every one. Finally, type the given checksum, pressing Enter once again.

This sum is a simple calculation — the sum of the ASCII codes of the hex digits, added to the line number. Thus if any errors are made they will be detected and you can re-type the line.

An error is also reported if you enter an illegal digit or a number of incorrect length. Some untrappable errors may occur, such as typing a letter in the line number, causing the program to return to SuperBasic with an error message. If this happens just type "Input Row" and Enter to enter the line again.

Entering −1 as the line number allows you to save the code. Entering −2 as the line number allows you to load a code file. In both cases the filename will be MDV1-Meanies. When you have entered all the lines, just enter −3 as the line number to exit the program. Now type the following:

'SEXEC MDV1_MEANIES_EXE_,codespc, 3800,0'

To run the game type:

'EXEC_W MDV1_MEANIES_EXE'

You have been placed in charge of a defence trench on board a spacecraft. Unfortunately, the blue meanies which inhabit this sector of the galaxy are enraged by your presence and are determined to destroy the spacecraft. It is your task to stop them.

The meanies attack the trench in suicide squads of six. You must defend it with the four lasers and moveable base ship at your disposal. Firing your various guns saps your energy store, so accuracy counts!

As the meanies land they gradually erode the trench, stealing energy as they do so, but you can gain energy by shooting them with the base ship. You gain points for shooting a meanie with any gun.

At random intervals energy modules descend into the trench. If you allow them to land they will give up energy to you. But be warned — shooting an energy module will cost you dearly in energy.

The game speeds up every 250 points. It ends if your energy level falls below zero or if all your guns are destroyed. My best score is 1,920 points.

Keys are:

D — fire top left gun
L — fire top right gun
C — fire bottom left gun
, — fire bottom right gun
S — move base ship left
; — move base ship right
Space — fire base ship
Enter — pause
Esc — exit from program

A copy of the game is available on a Microdrive cartridge from: 45 Lon-y-gors, Caerphilly, Mid-Glamorgan, CF8 1DP. Price: £4 — or £2 on receipt of your own cartridge.

```
100 RESTORE : PAPER 0 : MODE 4 : POKE 163976,255
110 DIM letter$(15,1),value(15)
120 FOR i=0 TO 15
130 READ letter$(i):value(i)=i:NEXT i
140 INPUT £0," Size: ";size
150 size=INT((size+15)/16)*16
160 codespc=RESPR(size)
170 Input_Hex
180 _
190 DEFine PROCedure Input_Hex
200 REPeat rows
210 INPUT row;TO 6 : IF row<1 OR row>size/16 THEN EXIT rows
220 IF row<1 OR row>size/16 THEN badline
230 lword=codespc+(row-1)*16  .
240 input_row : sum=sum+row
250 INPUT check : IF check<>sum THEN badline
260 END REPeat rows
270 IF row=-3 THEN STOP
280 IF row=-2 THEN LBYTES MDV1_MEANIES,codespc : PRINT : NEXT rows
290 IF row=-1 THEN DELETE MDV1_MEANIES : SBYTES MDV1_MEANIES,codespc,38
00 : PRINT : NEXT rows
300 badline
310 END DEFine
320 _
330 DEFine PROCedure input_row
340 sum=0
350 FOR col=1 TO 4
360 INPUT H$;"    ";
370 IF LEN(H$)<>8 THEN badline
380 hexdec 1 : hexdec 5
390 END FOR col
400 END DEFine
410 _
420 DEFine PROCedure hexdec(start)
430 dec=0
440 FOR char=0 TO 3
450 sum=sum+CODE(H$(char+start))
460 FOR digit=0 TO 15
470 IF H$(char+start)<>letter$(digit)THEN NEXT digit : badline
480 dec=dec+(value(digit)*(16^(3-char)))
490 END FOR char
500 POKE_W lword,dec : lword=lword+2
510 END DEFine
520 _
530 DEFine PROCedure badline
540 BEEP 3000,15 : CLS £0
550 PRINT £0,\"               Error - retype the line"
560 PRINT : NEXT rows
570 END DEFine
580 DATA '0','1','2','3','4','5','6','7','8','9','A','B','C','D','E','F
'
```

1	61000184	610000F4	61000158	610001A6	1642	51	00000032	6100032A	2A1F2C3C	00000060	1712
2	43FA0D98	61000AB4	61000ACA	43FA0D68	1807	52	43FA0918	610005B8	06450002	610005B0	1737
3	61000AA8	4BFA0E44	61000A6A	4BFA0E42	1813	53	04450002	28854E75	243C0000	000549FA	1749
4	61000A62	4BFA0E40	61000A5A	610001C6	1737	54	0ADA2F0C	2F026100	0170241F	285F053A	1819
5	4BFA0E2E	0C950000	00006D00	00644BFA	1776	55	0AC26700	00F22A14	2C2C0004	610006CC	1787
6	0BD30C15	00006700	00584BFA	0DC60C15	1767	56	61000126	61000662	0C000000	67000014	1666
7	00006600	00066100	019C143C	00016100	1632	57	4BFA0AA1	0F952C23	2A236100	039C6000	1819
8	0A660C01	00016600	00066100	0A680C01	1670	58	00C66100	05AC0C40	00006600	00BA0C46	1766
9	00086700	005C6100	01E86100	06C86100	1674	59	00726F00	00082C3C	00000000	4BFA0A78	1776
10	062E6100	02B46100	09A20281	0000000F	1674	60	2615283C	00000060	61000654	0C400000	1693
11	0C410005	6E00FF9A	61000540	6000FF92	1750	61	660000A8	26150643	0002283C	00000060	1701
12	4BFA0DBE	0C550000	6C000008	2ABC0000	1786	62	6100063C	0C400000	66000090	4BFA0A84	1767
13	000043FA	0D066100	0A02223A	0D9E4BFA	1782	63	2615282D	00046100	06260C40	00006600	1705
14	0D1C2A81	610009BE	61000A0A	6000FF26	1772	64	00384BFA	0A662615	282D0004	61000610	1765
15	33FC0002	0002808E	207A0D98	76FF7002	1768	65	0C400000	66000022	223C0000	000547FA	1721
16	4E427005	760072FF	4E41227C	00020000	1723	66	0A1A261B	281B8481	67000018	610005F0	1780
17	203C0000	20004299	51C8FFFC	43FA09F4	1802	67	0C400000	6700000C	2C2C0004	2A146000	1734
18	7C002219	7A000B01	66000018	52450C45	1702	68	000651C9	FFDE2F05	2F062A14	2C2C0004	1858
19	001D6600	FFF25246	0C46001E	6600FFE4	1805	69	610004C0	2C1F2A1F	43FA0840	610004A0	1807
20	4E752F05	2F06CAFC	0004CCFC	04000685	1835	70	29460004	2885383A	0A2851CC	FFFED9FC	1913
21	00020206	DC852446	7005D4FC	007E34FC	1788	71	00000008	51CAFEEC	4E756100	02BC4BFA	1884
22	2A0034BC	A80051C8	FFF22C1F	2A1F6000	1839	72	09B62A15	2C3C0000	00606100	04860645	1755
23	FFBC4BFA	0A167203	2A1D2C1D	43FA0ABC	1919	73	00026100	047E2ABC	000000FF	4BFA0995	1834
24	0C450008	66000006	43FA0A90	61000770	1707	74	08950007	6000FFC0	02810000	000F0C41	1765
25	51C9FFE6	4E75123C	0008143C	00017010	1772	75	00026E00	00080646	00024E75	0C410007	1734
26	4E4143FA	0BD63A78	00C64E95	4BFA0CE4	1886	76	6E000008	06450001	4E750C41	000C6E00	1770
27	2A8833FC	000A0002	808C33FC	00030002	1751	77	00060445	00014E75	4BFA095B	0C150000	1788
28	808E4E75	4BFA0CB4	2ABC0000	00002B7C	1842	78	6700010C	47FA0984	2A132C2B	00046100	1793
29	000001F4	00062B7C	00000000	000C2B7C	1709	79	05984252	426A0080	426A0100	426A0180	1755
30	00000001	00124BFA	0C4B1AFC	008F1AFC	1820	80	04460001	0C46FFFF	6F0000E6	6100057A	1839
31	00001ABC	00004BFA	0C3E2ABC	00000019	1792	81	0C52294C	670000DA	0C52A800	670000D2	1813
32	4BFA0C70	2ABC0000	001C2B7C	00000004	1781	82	083A0007	09106700	004249FA	0946282C	1784
33	00044E75	223A0C64	82FC00FA	C2FC0002	1817	83	00042614	96450C43	00006700	000A0C43	1742
34	49FA0C6E	4BFA0B3C	38851000	43FA09BC	1896	84	FFFF6600	00269846	0C440000	6600001C	1814
35	45FA0C08	700B24D9	51C8FFFC	4BFA0BF4	1929	85	6100009E	4BFA091C	2A152C2D	00046100	1827
36	1ABC003F	4BFA0C40	06950000	00014BFA	1818	86	03C86100	010E6000	0086243C	00000005	1734
37	0C366100	08504BFA	0BDC0C15	00FF6700	1821	87	49FA08C8	053A08BC	6700004C	2614282C	1860
38	001E4BFA	0C280495	00000001	0C95FFFF	1826	88	00049645	0C430000	6700000A	0C43FFFF	1822
39	FFFF6600	000A4BFA	0BBC1ABC	00FF4E75	1944	89	66000034	98460C44	00006600	002A6100	1736
40	083A0007	0BAF6700	00CE49FA	0BAA2A14	1849	90	00506100	01944BFA	08D20695	0000000A	1780
41	2C3C0000	00606100	067A0645	00026100	1687	91	610004F2	4BFA08CA	06950000	003C6100	1816
42	0672143C	00036100	083E0C01	00086600	1702	92	04E46000	002AD8FC	000851CA	FFA86100	1877
43	00240445	00036100	07D00C6A	00000480	1689	93	04880052	0200006A	02010080	006A0202	1729
44	6700000C	0C6AA800	00806600	002C2A14	1744	94	0100006A	02030180	26852746	00044E75	1749
45	60000026	0C010080	6600FFF4	04450001	1719	95	4BFA0843	1ABC0000	4E754BFA	08380C15	1904
46	610007A6	0C6A0000	04866700	FFE20C6A	1801	96	00006700	005A47FA	086A2C2B	00042A13	1816
47	2A000086	6700FFD8	4BFA0B78	2615282D	1841	97	61000300	06460001	740549FA	081E2614	1771
48	00046100	071A0C40	00006600	001C2615	1689	98	282C0004	610003F8	0C4000FF	67000024	1795
49	282D0004	06450002	61000704	04450002	1671	99	D8FC0008	51CAFFE8	6100044E	0C6A2A00	1924
50	0C400000	6700001A	2F054BFA	0B540695	1777	100	03806700	001C0C46	00756700	00142746	1758

101	00042C28	000443FA	06626100	02A24E75	1811	168	00000001	6000FFD6	2F062F05	CAFC0002	1919
102	4BFA081E	06950000	019047FA	07B67011	1849	169	06850002	0204CCFC	0100DC85	24462A1F	1922
103	4E414BFA	080C0495	000000C8	4BFA07B6	1894	170	2C1F4E75	322D0004	0C410015	66000018	1869
104	42154BFA	07EE2C2D	00042A15	61000284	1855	171	2F0D7011	76FF4E43	43FA033C	6100001C	1947
105	610003B8	02810000	001E0081	00000001	1720	172	2A5F323C	0015207A	03CA7011	76FF4E43	1950
106	06810000	000D4BFA	07CA2A81	2B7C0000	1855	173	22153678	00CE4E93	4E75207A	03B63A78	1945
107	00050004	4BFA07CA	610003EA	6100038C	1841	174	00D04E95	4E7547FA	02727011	17420006	1896
108	02810000	00034BFA	07C42A81	4E75143C	1841	175	4E414E75	383CFFFF	51CCFFFE	41FA0288	2092
109	00016100	04120C01	00406600	005A083A	1746	176	72FF7001	4E4276FF	70014E43	70024E42	1941
110	00070751	67000030	4BFA074B	0C1500FF	1843	177	4E751F00	001F1F00	001F1F00	001F1F00	1911
111	67000044	47FA070C	70114E41	1ABC00FF	1882	178	001F1F00	001F1F00	001F1F00	001F1F00	1898
112	4BFA077E	04950000	000A6100	03984BFA	1867	179	001F1F00	001F1F00	001F1F00	001F1F00	1899
113	07262A15	06450001	2C3C0000	005E47FA	1824	180	001F1F00	001F1F00	001F1F00	001F1F00	1900
114	074A6100	03640C52	294C6700	000A0C52	1814	181	001F1F00	001F1F00	001F1F00	001F1F00	1901
115	A8006600	FE9A4E75	2F052F06	2A142C2C	1919	182	001F1F00	001F1F00	001F1F80	003F1FC0	1931
116	00046100	01CE2C1F	2A1F6100	01DC4BFA	1898	183	007F1FE0	00FF1FFF	FFFF1FFF	FFFF1FFF	2213
117	06E20595	28BC0000	000A297C	00000000	1802	184	FFFF1FFF	FFFF1FFF	FFFF0000	00080000	2126
118	00044E75	143C0004	6100037C	0C010040	1786	185	00100000	00080000	00380000	00300000	1744
119	6600000A	43FA0434	60000044	0C010001	1776	186	00240000	00300000	004C0000	000A0000	1771
120	6600000A	43FA0444	60000034	143C0002	1785	187	00120000	00000000	00010000	000A0000	1744
121	61000354	0C010008	6600000A	43FA041C	1803	188	003A0000	00010000	00010000	002F0000	1770
122	6000001C	143C0007	6100033C	0C010080	1778	189	00260000	0002FFFF	FFFF0000	002F0000	1935
123	6600000A	43FA0424	60000004	4E752A19	1820	190	004E0000	0003FFFF	FFFF0000	00100000	1931
124	2C192619	2419073A	066B6600	00044E75	1835	191	00000000	001C0000	00000000	00280000	1757
125	2F0547FA	062E7011	4E412A1F	4BFA06A2	1936	192	00000000	00120000	000A0000	001C0000	1768
126	04950000	000A203C	00000025	6100029A	1763	193	000A0000	00260000	000A00AA	0000A856	1841
127	34BC8888	DA827205	47FA0678	282B0004	1905	194	0080AA55	00A000AA	806A00AA	806AAA55	1973
128	26139846	0C440000	6E000048	0C44FFFD	1882	195	00A0A856	008000AA	00000000	00AA0002	1862
129	6D000040	96450C43	00006700	000C6E00	1804	196	2A95000A	AA5502A9	00AA02A9	00AA000A	1967
130	0032B682	6600002C	2F002F02	2F062F05	1847	197	AA550002	2A950000	00AA0000	02010000	1849
131	4BFA0640	2A152C2D	00046100	00EC6100	1864	198	02010000	08070000	201F0A05	807F201F	1861
132	FE322A1F	2C1F241F	201F0440	00016000	1871	199	00FF201F	00FF0A05	AA558040	00008040	1938
133	006647FA	05E6261B	281B9846	0C440000	1873	200	000020D0	000008F4	000002FD	A05000FF	1902
134	6E000062	0C44FFFD	6D00005A	96450C43	1916	201	08F400FF	08F4AA55	A050000A	00A00025	1956
135	00006700	000C6E00	004CB682	66000046	1809	202	00580891	20460095	00560095	00560A90	1857
136	4BFA05B0	03952F00	2F062F05	2C232A23	1906	203	A0060025	0058000A	00A00A05	80400A05	1872
137	26FC0000	000F26BC	00000000	6100008A	1821	204	80402010	2010A251	A854A050	2814A251	1879
138	4BFA05D8	06950000	000A2A1F	2C1F201F	1916	205	A8542010	20100A05	8040002A	00A80080	1867
139	04800000	0001283C	00000FFF	51CCFFFE	1917	206	00020080	00020080	00020080	00020080	1782
140	60000014	51C9FF90	51C8FF22	283C0000	1887	207	00020080	0002002A	00A80000	00000A0A	1833
141	0FFF51CC	FFFE9A82	610001AE	42520680	1983	208	A0A02020	08082020	08082020	08082020	1842
142	00000001	0C400025	6600FFEC	4BFA058C	1898	209	08080A0A	A0A00000	00000000	00000000	1829
143	610001B2	4BFA058A	610001AA	4E756100	1884	210	00000002	00800008	00200008	00200080	1784
144	01887007	2499D5FC	00000080	51C8FFF6	1914	211	00020000	00000000	00000000	00000000	1749
145	4E756100	0174203C	00000007	4292D4FC	1850	212	00000000	00000202	80800202	80800000	1788
146	008051C8	FFF84E75	2F0547FA	04E67011	1953	213	00000000	00000000	00000901	00000000	1759
147	4E412A1F	43FA03A4	7E036100	FFC2303C	1953	214	000205DC	04E203E8	02EE01F4	00FA0000	1965
148	0FFF51C8	FFFE51CF	FFF26100	FFC64E75	2098	215	00000000	00000000	00000000	010701B0	1778
149	70006100	01340C52	A8006700	00500C6A	1818	216	000A0024	00F6000D	636F6E5F	31327831	1942
150	A8000080	67000046	0C6A2A00	00026700	1818	217	32613078	30000021	0A205343	4F52453A	1885
151	004C0C6A	2A000082	67000042	7E000C6A	1870	218	20202020	2020454E	45524759	3A202020	1867
152	2A000380	6700001A	7EFF0C6A	A8000380	1899	219	20202057	41564553	3A00001D	0A202020	1870
153	6700000E	7E010C6A	2A000382	66000048	1850	220	20202050	72657373	20616E79	206B6579	1912
154	06860000	0003DA87	6000001E	06860000	1813	221	20746F20	73746172	7400001A	0A202020	1889
155	00020485	00000001	6000000E	06860000	1758	222	20202020	47414D45	204F5645	522E2053	1903
156	00020685	00000001	61000042	6100FD6A	1799	223	434F5245	3A200004	20202020	00000000	1842
157	4BFA04AE	04950000	00142F02	610000C6	1877	224	001A0A08	0000AAAA	0B150001	000A1100	1915
158	241F103C	00FF4E75	7E0047FA	019E261B	1963	225	01000A08	0000AAAA	010A0002	001F3705	1913
159	281B6100	002A0C00	00FF6700	000E0647	1864	226	01000A08	0000AAAA	06100001	001EF105	1914
160	00010C47	00046D00	FFE64E75	8CFC0004	1937	227	01000000	00000000	00000000	00000000	1764
161	CCFC0004	8AFC0002	CAFC0002	4E757000	1971	228	00000000	00000000	00000000	00000000	1764
162	96850C43	00026C00	00200C43	FFFE6F00	1922	229	00000000	00000000	00000000	00000000	1765
163	00189886	0C440004	6C00000E	0C44FFFC	1928	230	00000000	00000000	00000000	00000000	1766
164	6F000006	103C00FF	4E754BFA	044A2215	1934	231	00000000	00000000	00000000	00000008	1775
165	D2BA0428	D2BA042A	60000006	2A814E75	1929	232	00000000	00150000	00000021	00000000	1777
166	E3816500	000E0801	00116600	00126000	1799	233	00000000	00001234	56780000	00000000	1805
167	FFEC0801	00116700	00066000	FFE00081	1897						

```
1 '        REM HIGHLIGHTER  !
2 '        by Stuart Clark !
3 REM
4 REM
5 '     reserve memory        !
10 MEMORY HIMEM-63
15 '    machine code loader !
20 FOR n=1 TO 62:REM
30 READ a$ :REM _ read each pair of hex digits!
40 POKE HIMEM+n,VAL("&"+a$):REM _ and POKE the code in
to reserved memory!
50 NEXT
55 '    object code!
60 DATA  fe,27,28,08,fe,5f,28,04
70 DATA  fe,21,20,07,f5,e5,cd,9c
80 DATA  bb,e1,f1,c3,00,00,fe,21
90 DATA  20,04,3e,46,18,0f,fe,5f
100 DATA 20,05,3e,45,f5,18,0c,fe
110 DATA 27,20,10,3e,45,f5,3e,0a
```

(listing continued on next page)

Rem Highlighter

Stuart Clark,
Gelnrothes,
Fife.

REM STATEMENTS can be boring to type in, but when it comes to finding your way around a large program, the increased legibility afforded by a liberal scattering of Remarks within the listing makes it all worthwhile. The problem is, though, that these Rems can themselves recede into the mass of the listing unless surrounded by plenty of space.

The advantages of using Rem Highlighter are that valuable memory and time are not wasted creating space around each Rem. The inverse writing of the Remark is done automatically and results in a very prominent display without the need for extra spaces, and the messages in bold typeface produce a tidy and legible hard copy.

Rem Highlighter comprises two short routines which are patched into the Rom indirections

(continued on next page)

(continued from previous page)

TXT Write Char and MC Wait printer. For those of you who are a little mystified by indirections, let me briefly explain. A number of the Firmware routines in Rom jump to addresses in Ram which contain a jump instruction to direct the program execution back to Rom. The "why" of it is that the programmer has the opportunity to alter the address in Ram to point to his own program instead, only jumping back to the Rom after carrying out some task or other.

The method of implementing the patches used here has been selected to ensure that it will work even if memory has already been reserved for another program. Study listing 1 to understand what is going on.

The first routine highlights Rems on the screen; the second causes the printer (Epson control codes) to emphasise the Rem message in accordance with the syntax below.

PRINTED OUTPUT

'message! — message printed in emphasised typeface, with a blank line before and after it.

REM message! — as above but without the preceding blank line. Useful for in-line Rems.

Messages delimited as above are displayed in inverse lettering. Extra lines are not generated.

The indirections can be reset to their default values by using

CALL &bb51

for screen and

CALL &bd28

for printer, and the routines switched on again by lines 240-270.

Finally, editing highlighted Rems using the copy cursor is easier with the screen routine switched off and the program re-listed, but can otherwise be done by using the delimiter characters to flip to inverse at the appropriate points.

(listing continued from previous page)

```
120 DATA cd,2b,bd,3e,1b,cd,2b,bd
130 DATA 30,f9,f1,c3,00,00
155 '   copy addresses from the ROM indirections to th
e jump instructions in our        routines !
200 POKE HIMEM+21,PEEK(&BDD4)
210 POKE HIMEM+22,PEEK(&BDD5)
220 POKE HIMEM+61,PEEK(&BDF2)
230 POKE HIMEM+62,PEEK(&BDF3)
235 '   replace the indirection addresses with those o
f our routines !
240 POKE &BDD4,UNT(HIMEM+1)AND &FF
250 POKE &BDD5,(HIMEM+1)/256
260 POKE &BDF2,UNT(HIMEM+23)AND &FF
270 POKE &BDF3,(HIMEM+23)/256
280 '   CALL &bb51 to reset the screen print indirectio
n                                    CALL &bd28 to reset t
he printer indirection !
290 '   GOTO 240 to set up the highlighter routines aga
in!
300 DELETE -230
```

Wokstix

R Sargent,
Donnington,
Gloucestershire.

Enterprise

RANDOM MUSIC on a computer is not easy to achieve. That this should be so when random numbers are a computer's stock-in-trade, is, on the face of it, something of a puzzle. Why can't the computer be asked to "produce a number, any number" and then go on to use it as a frequency which the sound chip will obligingly play?

In fact this can be done but the result won't be musical — it won't be particularly pleasant either. What the sound chip requires is a number representing one of the frequencies that forms the equal-tempered chromatic scale. Our Western ears are tuned to expect these notes, and anything else is treated as strange, discordant, or horrible!

Notes from the standard scale can't just be played in any order — certain sequences sound right whilst others don't, and, unluckily from the computers point of view, the right order can't be quantified mathematically. There is, though, a way of cheating. When you play the black notes at random on a piano, they tend to sound tuneful, whilst the same can't be said of the white notes. This fact — which is probably due to some fundamental law of physics — can be put to good use as the software offering Wokstix illustrates.

In this program, black notes values — they are, of course, sharps — are loaded into the B(N) array. They are then played in varied sequence, forever, or until Stop is pressed.

The RND function is used at various points to ensure that no regular pattern is followed. RND, which always looks complicated when it appears in a program, works like this:

N=INT ((RND*15)+1)

places an integer random number in the range 1 to 15 inclusive into the variable N. Often the integer function can be dispensed with, leaving N+(RND*15)+1. If you want something to happen 20 per cent of the time, then a conditional branch can be set by the code:

IF (RND*100)>80 THEN GOTO some other routine

This play is used more than once in Wokstix to add variety to the music by adjusting tempo and sounding the chords. The program uses T or 15 consecutive sharps, although the amount can be easily altered. A starting note is selected in line 230. Let's assume B(4) was chosen. Lines 260/270 "flip a coin" to see whether the program will play up the scale or down the scale — there are separate routines for each eventuality. Assuming the sequence chosen is a rising scale, line 300 determines S, the number of notes to be played.

Line 310 represents a joker in the pack. The RND function here will cause the "rising sequence" routine to be abandoned 20 per cent of the time and another starting note will then be chosen at line 230. If the joker is successfully navigated, then S number of consecutive notes will be played, providing the limits of B(N) are not exceeded.

To add spice to the music, another RND at line 332 occasionally causes the length of the note played to be increased by half. Line 340 actually plays the note using one channel of the Dave Chip. Line 342 occasionally adds a chord — these Sound statements will be explained a little more fully later on.

At the end of the For-Next loop, either control passes back to the coin-flipper at line 260, or else the program decides to move directly to the "fall-

```
 20 REM ENTERPRISE WOKSTIX
 30 ENVELOPE NUMBER 1;.4,63,63,1;-.4,0,0,10;RELEASE;0,-63,-63,30
 40 LET D=15:LET V=100:LET Q=7:LET T=15:LET VL=V/2
 50 NUMERIC B(20)
 52 CLEAR SOUND
140 RESTORE 155
150 DATA 14,16,19,21,23
155 DATA 26,28,31,33,35
170 DATA 38,40,43,45,47
175 DATA 50,52,55,57,59
180 DATA 62,64,67,69,71
210 ! load array with sharps
220 FOR N=1 TO 20
222   READ B(N)
224 NEXT N
230 LET N=INT((RND*T)+1)
250 ! playing loop
260 LET COIN=INT(RND*11)
270 IF COIN<6 THEN GOTO 440
290 ! rising sequence
300 LET S=INT((RND*Q)+1)
302 LET Z=1
310 IF (RND*100)>80 THEN GOTO 230
320 FOR X=1 TO S
330   LET A=1:LET L=1
332   IF (RND*100)>80 THEN LET A=1.5
340   SOUND PITCH B(N),DURATION D*A,RIGHT V,LEFT V,SOURCE 0,ENVELOPE 1,SYNC 1
342   IF (RND*100)<66 THEN LET L=0
343   SOUND PITCH B(N+3),DURATION D*A,RIGHT V*L,LEFT V*L,SOURCE 1,SYNC 1
350   LET N=N+1
360   IF N<>T+1 THEN GOTO 370
362   LET X=S:LET Z=0:LET N=N-1
370 NEXT X
380 IF Z=0 THEN GOTO 420
390 GOTO 260
410 ! falling sequence
420 LET S=INT((RND*Q)+1)
422 LET Z=1
430 IF (RND*100)>80 THEN GOTO 230
440 FOR X=1 TO S
450   LET A=1:LET L=1
452   IF (RND*100)>80 THEN LET A=2
460   SOUND PITCH B(N),DURATION D*A,RIGHT V,LEFT V,SOURCE 0,ENVELOPE 1,SYNC 1
462   IF (RND*100)<66 THEN LET L=0
463   SOUND PITCH B(N+2),DURATION D*A,RIGHT VL*L,LEFT VL*L,SOURCE 1,SYNC 1
470   LET N=N-1
480   IF N>0 THEN GOTO 490
482   LET X=S:LET Z=0:LET N=N+1
490 NEXT X
500 IF Z=0 THEN GOTO 300
510 GOTO 260
```

ing sequence" routine at 420. Unpredictable things, computers! However, the results are quite pleasant, and envelope shaping gives the music a decidedly oriental flavour.

The main Sound command is line 340, in the rising sequence loop, and its identical twin in the falling sequence loop is line 460.

The Pitch of the note is given by B(N), and is one of the values extracted from the pitch table in Data lines 155-175. The program is not set to use the low-sounding notes on Data line 150, though they could be used if Restore 155 were to be changed to Restore 150. The pitch values in Data line 180 are used in association with a simple chord mechanism.

The Duration of the note is set to 15 in line 40, but is modified in the Sound statement by multiplying it by A, where A is randomly set to 1, 1.5, or 2.

The Volume is set to V, which is 100, by the Right and left statements.

Source 0 is the channel used for the main melody, playing a note on every pass of the loop.

Envelope 1 modifies the Source 1 sound. The envelope itself is formed in line 30, and the values there provide the eastern emphasis. Envelope 255 is the default envelope, and can be used to westernise the sound if you don't like envelope 1.

Sync 1 is there to remind sound source 1 that it must wait to synchronise with the other sound source providing the chord option.

The chord note is sounded by lines 343 and 463. These lines make available a note which is two or three sharps higher than the melody note, thus providing the means of forming a simple chord. This, however, is not sounded on every note, but only on occasions which are determined by the random factor of lines 342 and 462.

No envelope statement is present, so the note has a different texture. When a chord is not required (which is 66 per cent of the time) L is set to zero rather than 1, and the chord-note is thus turned off.

Adjustments can be made to the envelope shape and to the gap between the chord-notes but care is needed here, since +6 in Pitch B(N+6) is too wide a gap and will cause the program to run off the end of the B(N) array! Most of the values in line 40 can be altered, but T cannot exceed 15 unless the B(N) array is extended by a corresponding amount, and that, of course, cannot be done unless more sharps are entered into the data table lines 150-180.

The value of Q represents the maximum range that the notes can run in the rising/falling sequence routines and again, this value can't be too large or else the program will run out of data.

Finally, if you haven't got an Enterprise, this program will convert easily to other micros provided the pitch values are adjusted. The user handbooks will give the values for sharps — they may be called pitch, frequency or period values depending on the style favoured by the writers.

Sound effects

Kai Weber,
Reading,
Berkshire.

Spectrum

ONCE OF THE better features of the now defunct Dragon was its Play command which allowed the user to simply enter music as a string rather than lots of confusing numbers as with the Spectrum's Beep command. The program I have written for the 48K Spectrum imitates the Play command but instead of using the Rom subroutine to produce the notes, it makes use of a clever piece of machine code which generates music more like that heard on a Commodore 64 or BBC micro, greatly enhancing any program by giving it that professional touch.

The program is written entirely in machine code, but the hex is held in Basic Data statements so that it can easily be Merged with any of your programs.

To use the routine, start by carefully typing in listing 1, taking extra care with the hexadecimal in the Data statements. Before saving the program to tape or Microdrive, Run it so the computer can check that the numbers match with its checksum.

Once it has been successfully Saved and Verified, clear the Basic program by typing New — do not use Print USR 0. The machine code is stored out of harm's way above RAMtop.

In order to store the notes to be played, the routine reserves a string variable, namely T$. Each time you want the computer to scan T$ and play the notes held within, you should enter:

RANDOMIZE USR 65070

The note generator has a range of three octaves and for the sake of argument I shall refer to them as upper, middle and lower. When called, the routine scans the contents of T$ one character at a time and depending on the character it finds it will act accordingly:

1. Characters in the range A to G — must be upper case — will cause the corresponding notes to be played. If the letter is followed by a hash symbol, the note will be played as a sharp and similarly if it is followed by a lower case b then the note will be played as a flat.

2. The characters 1, 2 and 3 are used to change octave. Character 1 will change the current octave to upper, 2 changes to middle and 3 changes to lower. If the character represents the current octve then no change is made. It should be noted that each time the routine is called, it will always start off in the upper octave.

3. The letter T — or t — is used to change the duration of each individual note. The code of the character following this letter is taken as the new duration and can therefore be in the range 0-255 thanks to a bit of string slicing.

Becaue of the way the CPU works, a value of 0 is equivalent to 255, 1 being the fastest possible. At the place where you want any following notes to have a duration of, say, 50, you should have something like this in the reserved variable, T$:

"T"+CHR$ 50+"REST OF STRING"

This is the simplest way to specify a new duration — if you are unhappy with a duration of 50 you just change the number following the CHR$ function either by editing the appropriate line or by using

LET T$ (XX+1)=CHR$ new duration

where XX is the number of characters in T$ up to and including the letter T. The routine will remember the duration that was used last time it was called to save you having to keep using the T command — the first time it is called it takes the duration to be 0, the slowest.

4. The letter P — or p — will make the computer pause for a very short period of time after each note has been played.

5. The letter O — or o will turn off the pause between notes described above. The computer will remember whether it was on or off from the previous time it was called — the first time the routine is called the pause is on.

6. H — or h — will halt the computer for one fifth of a second whatever the status of the pause command described above. This command is, in effect, a manual pause and can be used to provide a lengthy gap between, say, two different tunes by placing lots of Hs together. Five Hs will pause for one second.

In addition to the above, pressing Break at any time will stop the routine with report D, Break — Cont repeats.

By specifying a very short duration with no pause between notes, much better sound effects can be generated than are possible using Beep. For example, try something like this:

LET T$="T"+CHR$ 5+"O3CDEFGAB2 CDEFGAB1CDEFGAB": RANDOMIZE USR 65070

If you do not fancy typing in listings 1 and 2, I can supply them on cassette — just send a cheque for £1.50 to me at 25 Andrews Road, Earley, Reading, Berkshire RG6 2PJ.

Listing 1.

```
9900 CLEAR 65068: LET CHECK=0: L
ET X=65069: FOR N=1 TO 4: READ A
$
9910 FOR F=1 TO LEN A$ STEP 2: L
ET H$=A$(F TO F+1)
9920 LET Y=CODE H$-48: LET Y=Y-(
7 AND Y>9): LET Z=CODE H$(2)-48:
 LET Z=Z-(7 AND Z>9)
9930 POKE X,Y*16+Z: LET CHECK=CH
ECK+Y*16+Z
9940 LET X=X+1: NEXT F: NEXT N
9950 IF CHECK<>30199 THEN PRINT
"ERROR IN HEX DATA - PLEASE CHEC
K": STOP
9960 DATA "002A5D5CE52154FF225D5
CCD8228DA7006234E23463A2DFEA7082
3CD11FFCA07FF1115FF7ECBAFFE48200
93E0A763D20FCC3FAFEFE54200ECD10F
FCA07FF237E3257FFC3FAFEFE5020050
8"
9970 DATA "AF08187EFE4FC287FE08F
6010818737EFE313815FE343011D630C
5470E151100FF7B8110FD5FC11859FE4
13855FE483051D5D641835F237EFE232
0073E07835F081808FE6220063E0E835
F"
9980 DATA "0B2328C5E5EB565A1C060
03A57FF4F3A485C0F0F0FE607F3D3FE1
5200356EE101D20045E1CEE1010EF0D2
0ECFB0820037676760BE1C1D1CD541FD
2520523CD10FFC251FE083220FEE1225
D"
9990 DATA "5CC9087950C900231F3B3
42E2C2721003731302925252100037310
029463E76695E594F42007064000544A4
A420070640054BD7FEDD4BEB29E8500E
0C800A8959585000E0C800A85424 3D00"
```

Listing 2.

```
   5 PRINT "AN ADAPTION OF 'FRER
E GUSTAV'    FROM CHAPTER 19 OF T
HE OLD        SPECTRUM MANUAL.""'"W
HEN THE TUNE HAS FINISHED,     P
RESS 'r' TO REPEAT OR ANY OTHERK
EY TO QUIT."
  10 LET A$="t"+CHR$ 128+"p2CDt"
+CHR$ 64+"D#Dt"+CHR$ 128+"C"
  20 LET B$="D#FoGpG"
  30 LET C$="t"+CHR$ 96+"Gt"+CHR
$ 32+"G#t"+CHR$ 64+"GFD#Dt"+CHR$
 128+"C"
  40 LET D$="C3G2oCpC"
1000 LET t$=a$+a$+b$+b$+c$+c$+d$
+d$
1010 RANDOMIZE USR 65070: PAUSE
0: IF INKEY$="r" THEN GO TO 1010
1020 STOP
```

Circus

A J Botham,
Lupset,
Wakefield.

BBC

BOUNCE THE flying clown on the end of the seesaw and catapult his colleague into the roof of the Big Top popping balloons as he goes. Achieve extra height by landing him close to the

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end but be careful, miss the seesaw altogether and loss life is inevitable. Points are awarded per balloon with a bonus for the completion of a line. Lives are restricted to three but an extra one can be obtained by accumulating more than 5,000 points.

The seesaw can be controlled by either joystick or keyboard the keys being Delete to move left, Copy to move right and Ctrl to turn the seesaw around.

Circus should be entered as follows. First type in program 1 and Save it as "CIRCUS". This sets up the user-defined characters and displays a title page while loading. Next type in program 2 and Save immediately after program 1 as "Circus". In future when the first program is chained, program 2 will be chained automatically.

For disc users, program 2 is too long to run due to the lack of memory in Mode 2. This problem can be overcome by adding an extra line to program 1 as follows:

55 PAGE=&1200

The programs can then be saved as before.

Although Circus is written entirely in Basic the game runs extremely quickly. This is due to the use of structured programming techniques as well as extensive use of the GCOL 3,X command and string handling functions for smooth flicker-free graphics. Full use is made of the BBC's Sound and Envelope commands to provide some realistic sound effects which merge nicely with the animated graphics. A hall of fame is included which makes excellent use of Mode 7 as does the title page. Here is a brief explanation of the program.

Each line of balloons is held as a string. This makes life easy by allowing the use of the Left$ and Right$ functions for scrolling the balloons. When a balloon is burst, the Mid$ function is used to place a space in the required position. A count of the number of balloons burst in each line is kept so that a new line of balloons can be produced upon completion of the line.

As the clown flies through the air his path is governed by the equation $Y=mX^2$ where m is a constant. The height reached by the man can therefore be varied by changing the value of m.

The GCOL 3,X command is used for speed and for its ease of use. When the character is printed, the foreground colour to be used, X, is exclusively-Ored with the colour already there. One of the advantages of this method is that the character can then be deleted by printing again with the same foreground colour in the same place. This method is also used when moving the seesaw.

Listing 1.

```
   10 *TV255
   20 PROCdefine
   30 MODE7
   40 VDU23;8202;0;0;0;
   50 PROCtitle
   60 *OPT 1,0
   70 CHAIN"Circus"
   80 END
   90 DEFPROCdefine
  100 FOR CHAR%=224 TO 243
  110 READ A,B,C,D,E,F,G,H
  120 VDU23,CHAR%,A,B,C,D,E,F,G,H
  130 NEXT
  140 ENDPROC
  150 DEFPROCtitle
  160 FOR I%=1 TO 2:PRINTCHR$129;CHR$157;CHR$131;CHR$141;TAB(17);"CIRCUS":NEXT
  170 PRINT'CHR$134;"  Scoring :-";TAB(19)"per";TAB(29);"complete"
  180 PRINTCHR$134;TAB(17)"balloon";TAB(31);"line"
  190 PRINT'CHR$133;TAB(5);"RED";CHR$135;TAB(13);"-";CHR$130;TAB(17);"50 Pts";CHR$129;CHR$136;TAB(29);"200 Pts"
  200 PRINT'CHR$131;TAB(5);"YELLOW";CHR$135;TAB(13);"-";CHR$130;TAB(17);"30 Pts";CHR$129;CHR$136;TAB(29);"100 Pts"
  210 PRINT'CHR$134;TAB(5);"BLUE";CHR$135;TAB(13);"-";CHR$130;TAB(17);"10 Pts";CHR$129;CHR$136;TAB(29);"100 Pts"
  220 PRINT'CHR$134;TAB(8);"extra life for 5000 Pts"
  230 PRINT'CHR$134;"  Use joystick or keys :-"
  240 PRINT'CHR$130;TAB(6)"DELETE";CHR$135;TAB(14);"-";CHR$133;TAB(17);"Move seesaw left"
  250 PRINT'CHR$130;TAB(6)"COPY";CHR$135;TAB(14);"-";CHR$133;TAB(17);"Move seesaw right"
  260 PRINT'CHR$130;TAB(6)"CTRL";CHR$135;TAB(14);"-";CHR$133;TAB(17);"Swap seesaw over"
  270 PRINT'CHR$131"  loading main program - please wait"
  280 PRINT'CHR$129;CHR$157;CHR$135;TAB(13);"by  A.J.Botham";
  290 ENDPROC
  300 DATA112,248,248,252,252,126,58,0,255,255,255,0,0,255,255,255
  310 DATA 56,56,18,28,16,40,71,124,0,0,0,0,3,60,192,0,0,0,0,15,248,24,60,126,0,3,60,192,0,0,0,0,62,192,0,0,0,0,0,0
  320 DATA 124,3,0,0,0,0,0,0,0,192,60,3,0,0,0,0,0,0,0,240,31,24,60,126,0,0,0,0,192,60,3,0,28,28,72,56,8,20,226,62
  330 DATA 28,28,8,127,8,20,34,65,28,28,72,62,9,116,2,1,28,28,9,62,72,23,32,64
  340 DATA 0,3,1,1,1,221,255,220,56,56,16,126,17,40,68,102,3,1,221,255,220,127,0,0,28,28,8,62,200,20,34,51,0,0,0,0,255,0,0,0
```

Listing 2.

```
>C
   10 *TV255
   20 *FX19
   30 *FX11,0
   40 VDU5:PROCsetup1
   50 REPEAT
   60 MODE7:PROCtable
   70 MODE2:SC%=0:GO%=2:EXTRA%=FALSE
   80 VDU23;8202;0;0;0;
   90 PROCsetup2:PROClives:PROCscore
  100 REPEAT
  110 PROCinit:PROCmove:PROCpause(100)
  120 REPEAT
  130 FOR X%=-9 TO 10
  140 BOO%=BOO%+1:IF JOY% PROCseesaw2 ELSE PROCseesaw1
  150 PROCman:IF JOY% PROCseesaw2 ELSE PROCseesaw1
  160 PROCpause(T%):IF JOY% PROCseesaw2 ELSE PROCseesaw1
  170 IF BOO%=5 PROCballoon:BOO%=0
  180 IF JOY% PROCseesaw2 ELSE PROCseesaw1
  190 NEXT
  200 TI%=TI%+1:IF TI%>20 T%=T%-1:TI%=0
  210 IF RAMP$=SEE$ PROCcheck1 ELSE PROCcheck2
  220 UNTIL DIE%=TRUE
  230 PROCsplat
  240 UNTIL GO%<0
  250 VDU4:COLOUR 6:PRINTTAB(5,15)"GAME  OVER":PROCpause(200)
  260 IF SC%>HI%(7) MODE5:PROCover
  270 UNTIL FALSE
  280 END
  290 DEFPROCsetup1
  300 ENVELOPE 1,5, 2,1,1, 1,1,1, 121,-10,-5,-2,120,120
  310 ENVELOPE 2,1, 10,0,-5, 2,1,4, 127,-100,-5,-3,126,126
  320 ENVELOPE 3,2, 0,0,0, 1,1,1, 120,-10,0,-10,120,120
  330 ENVELOPE 4,6, 2,-4,1, 1,1,1, 60,-1,0,-5,120,110
  340 A$="":FOR BAL%=1 TO 20:A$=A$+CHR$224:NEXT BAL%
  350 DIM B$(3),B%(3)
  360 SEE$=CHR$226+CHR$227+CHR$228+CHR$229+CHR$230
  370 SAW$=CHR$231+CHR$232+CHR$233+CHR$234+CHR$235
  380 STRET1$=CHR$240+CHR$243+CHR$242
  390 STRET2$=CHR$240+CHR$241+CHR$242
  400 DIM MAN$(2),HI$(8),HI%(8)
  410 FOR A%=0 TO 7:HI%(A%)=500:HI$(A%)="ADCOMSOFT":NEXT A%
  420 MAN$(0)=CHR$236:MAN$(1)=CHR$(237):MAN$(2)=CHR$238
  430 ENDPROC
  440 DEFPROCsetup2
  450 VDU19,1,7;0;19,4,7;0;19,9,5;0;19,14,7;0;
  460 FOR A%=1 TO 3:B%(A%)=20:B$(A%)=A$:NEXT
  470 ENDPROC
  480 DEFPROCinit
  490 DIS%=480:RAMP$=SEE$:H%=0:V%=96:LEAP%=2:MAN%=0:DIR%=1:BOO%=4:DIE%=FALSE:TI%=0:T%=10
  500 VDU4:COLOUR 2:FOR I%=0 TO 19:PRINTTAB(I%,30);CHR$225;:NEXT:VDU5
  510 GCOL 3,7:MOVE DIS%,96:PRINTRAMP$
  520 MOVE H%,V%:PRINTMAN$(MAN%)
  530 ENDPROC
  540 DEFPROCpause(T%)
  550 TIME=0
  560 REPEAT:UNTIL TIME>=T%
  570 ENDPROC
  580 DEFPROCballoon
  590 BAL$=LEFT$(B$(1),1):B$(1)=RIGHT$(B$(1),19)+BAL$
  600 BAL$=LEFT$(B$(2),19):B$(2)=RIGHT$(B$(2),1)+BAL$
  610 BAL$=LEFT$(B$(3),1):B$(3)=RIGHT$(B$(3),19)+BAL$
  620 IF V%>=896 MOVE H%,V%:PRINTMAN$(MAN%)
  630 PROCmove
  640 IF V%>=896 MOVE H%,V%:PRINTMAN$(MAN%)
  650 ENDPROC
  660 DEFPROCseesaw1
  670 IF (NOT INKEY-90) AND (NOT INKEY-106) AND (NOT INKEY-2):ENDPROC
  680 MOVE DIS%,96:PRINTRAMP$
  690 IF INKEY-2 AND RAMP$=SEE$ RAMP$=SAW$ ELSE IF INKEY-2 AND RAMP$=SAW$ RAMP$=SEE$
  700 DIS%=DIS%+24*(INKEY-90 AND DIS%>0)-24*(INKEY-106 AND DIS%<960)
  710 MOVE DIS%,96:PRINTRAMP$
  720 ENDPROC
  730 DEFPROCseesaw2
  740 J%=ADVAL(0) AND 3:K%=ADVAL(1)
  750 IF J%=0 AND K%<52000 AND K%>12000 ENDPROC
  760 MOVE DIS%,96:PRINTRAMP$
  770 IF J%=1 AND RAMP$=SEE$ RAMP$=SAW$ ELSE IF J%=1 AND RAMP$=SAW$ RAMP$=SEE$
  780 DIS%=DIS%+24*(K%>52000 AND DIS%>0)-24*(K%<12000 AND DIS%<960)
  790 MOVE DIS%,96:PRINTRAMP$
  800 ENDPROC
  810 DEFPROCman
  820 MOVE H%,V%:PRINT MAN$(MAN%)
  830 IF LEAP%=1 PROCjump(8.96) ELSE IF LEAP%=2 PROCjump(8.64) ELSE IF LEAP%=3 PROCjump(8.32)
  840 MAN%=MAN%+1:IFMAN%=3 MAN%=0
  850 IF (POINT(H%+32,V%)<>0 AND POINT(H%+32,V%)<>7) PROCpop(H%+32,V%) ELSE IF (POINT(H%+32,V%-32)<>0 AND POINT(H%+32,V%-32)<>7) PROCpop(H%+32,V%-32) ELSE IF (POINT(H%+32,V%-16)<>0 AND POINT(H%+32,V%-16)<>7) PROCpop(H%+32,V%-16)
  860 MOVE H%,V%:PRINTMAN$(MAN%)
  870 ENDPROC
  880 DEFPROCjump(Z)
  890 Y%=INT(Z*(100-(X%*X%)))+96
  900 H%=H%+(47*DIR%):V%=Y%
  910 IF H%>1216 H%=H%-45:DIR%=-DIR% ELSE IF H%<0 H%=H%+45:DIR%=-DIR%
  920 ENDPROC
  930 DEFPROCcheck1
  940 DIF%=H%-DIS%
  950 IF DIF%<=96 OR DIF%>=288 DIE%=TRUE:ENDPROC ELSE LEAP%=1-(DIF%<224)-(DIF%<160)
  960 MOVE H%,V%:PRINTMAN$(MAN%)
  970 MOVE DIS%,96:PRINTRAMP$
  980 RAMP$=SAW$:H%=DIS%
  990 SOUND &11,1,0,30
 1000 MOVE DIS%,96:PRINTRAMP$
 1010 MOVE H%,V%:PRINTMAN$(MAN%)
 1020 IF DIR%=-1 DIR%=1
 1030 ENDPROC
 1040 DEFPROCcheck2
 1050 DIF%=H%-DIS%
 1060 IF DIF%<=-32 OR DIF%>=160 DIE%=TRUE:ENDPROC ELSE LEAP%=3+(DIF%<96)+(DIF%<32)
 1070 MOVE H%,V%:PRINTMAN$(MAN%)
 1080 MOVE DIS%,96:PRINTRAMP$
 1090 RAMP$=SEE$:H%=DIS%+256
 1100 MOVE H%,V%:PRINTMAN$(MAN%)
 1110 MOVE DIS%,96:PRINTRAMP$
 1120 SOUND &11,1,0,30
 1130 IF DIR%=1 DIR%=-1
 1140 ENDPROC
 1150 DEFPROCsplat
 1160 MOVE DIS%,96:PRINTRAMP$
 1170 MOVE H%,96:PRINTMAN$(MAN%)
 1180 MOVE H%,96:PRINTCHR$239
 1190 SOUND 0,4,7,10:PROCpause(120)
 1200 DIE%=FALSE
 1210 *FX21,5
 1220 SOUND &13,-10,130,10:FOR T=1 TO 5:SOUND 3,-10,95,10:SOUND 3,-10,130,10:NEXT
 1230 IF H%>192 FOR ST%=0 TO (H%-192) STEP 12:MOVE ST%,96:PRINTSTRET1$:MOVE ST%,96:PRINTSTRET1$:NEXT
 1240 MOVE H%,96:PRINTCHR$239
 1250 FOR ST%=(H%-192) TO 1088 STEP 12:MOVE ST%,96:PRINTSTRET2$:MOVE ST%,96:PRINTSTRET2$:NEXT
 1260 *FX21,0
 1270 GO%=GO%-1:PROClives:PROCscore
 1280 ENDPROC
 1290 DEFPROCpop(HORIZ%,VERT%)
 1300 SOUND &11,2,253,50
 1310 A%=(1024-VERT%) DIV 32
 1320 S%=HORIZ% DIV 64+1
 1330 B$(A%)=LEFT$(B$(A%),S%-1)+CHR$32+RIGHT$(B$(A%),20-S%)
 1340 PROCvalue(A%):PROCnewline(A%):PROCscore:PROCmove:X%=-X%
 1350 ENDPROC
 1360 DEFPROCvalue(A%)
 1370 IF A%=1 SC%=SC%+50:ENDPROC
 1380 IF A%=2 SC%=SC%+30:ENDPROC
 1390 SC%=SC%+10:ENDPROC
 1400 DEFPROCscore
 1410 VDU4,30
 1420 IF SC%>=5000 AND EXTRA%=FALSE EXTRA%=TRUE:GO%=GO%+1:PROClives:SOUND &12,3,193,5
 1430 COLOUR 7
 1440 PRINT"SCORE ";SC%;TAB(15);STRING$(4-LEN(LIFE$)," ");LIFE$
 1450 VDU5
 1460 ENDPROC
 1470 DEFPROClives
 1480 IF GO%<=0 LIFE$="    " ELSELIFE$="":FOR L%=1 TO GO%:LIFE$=LIFE$+CHR$236:NEXT
 1490 ENDPROC
 1500 DEFPROCnewline(A%)
 1510 B%(A%)=B%(A%)-1
 1520 IF B%(A%)<>0 ENDPROC
 1530 B$(A%)=A$:B%(A%)=20
 1540 IF A%=1 SC%=SC%+200
 1550 IF A%=2 SC%=SC%+100
 1560 IF A%=3 SC%=SC%+100
 1570 ENDPROC
 1580 DEFPROCmove
 1590 VDU4,30,10
 1600 COLOUR 9:PRINTB$(1);
 1610 COLOUR 3:PRINTB$(2);
 1620 COLOUR 6:PRINTB$(3);
 1630 VDU5
 1640 ENDPROC
 1650 DEFPROCover
 1660 PROCenter
 1670 HI%(8)=SC%:HI$(8)=NAME$
 1680 FOR G%=7 TO 0 STEP -1:IF HI%(G%)<=HI%(G%+1) D%=HI%(G%):HI%(G%)=HI%(G%+1):HI%(G%+1)=D%:D$=HI$(G%):HI$(G%)=HI$(G%+1):HI$(G%+1)=D$
 1690 NEXT G%
 1700 ENDPROC
 1710 DEFPROCenter
 1720 NAME$=""
 1730 CLS:VDU17,2:PRINT'''"  YOUR SCORE IS ONE":VDU17,3:PRINT'"  OF THE TOP EIGHT.":VDU17,2:PRINT'"    ENTER YOUR NAME"
 1740 VDU28,2,16,18,14,17,129,12:PRINT'" ";
 1750 CHAR%=1:REPEAT:G=ASC(GET$):IF G=13 CHAR%=16 ELSE IF G=127 AND CHAR%>=1CHAR%=CHAR%-1:NAME$=LEFT$(NAME$,CHAR%-1):VDUG ELSE VDUG:CHAR%=CHAR%+1:NAME$=NAME$+CHR$(G)
 1760 UNTIL CHAR%>15
 1770 VDU26,17,131,17,1,:PRINTTAB(5,23)"PRESS SPACE":REPEAT UNTIL GET$=" "
 1780 ENDPROC
 1790 DEFPROCtable
 1800 VDU23;8202;0;0;0;
 1810 FOR I%=1 TO 2:PRINTCHR$129;CHR$157;CHR$131;CHR$141;TAB(10);"CIRCUS  HIGH  SCORES":NEXT
 1820 PRINT:FOR I%=1 TO 2:PRINTCHR$134;CHR$141;TAB(12);"Today's greatest":NEXT
 1830 FOR I=1 TO 8
 1840 PRINT'"  ";CHR$130;I;CHR$135;" : ";HI%(I-1);TAB(15);"....    ";CHR$131;HI$(I-1)
 1850 NEXT
 1860 PRINT''TAB(4);CHR$134;CHR$136;"Press SPACE or FIRE to play"
 1870 REPEAT A%=ADVAL(0):UNTIL A%=1 OR INKEY-99
 1880 IF A%=1 JOY%=TRUE ELSE JOY%=FALSE
 1890 ENDPROC
```



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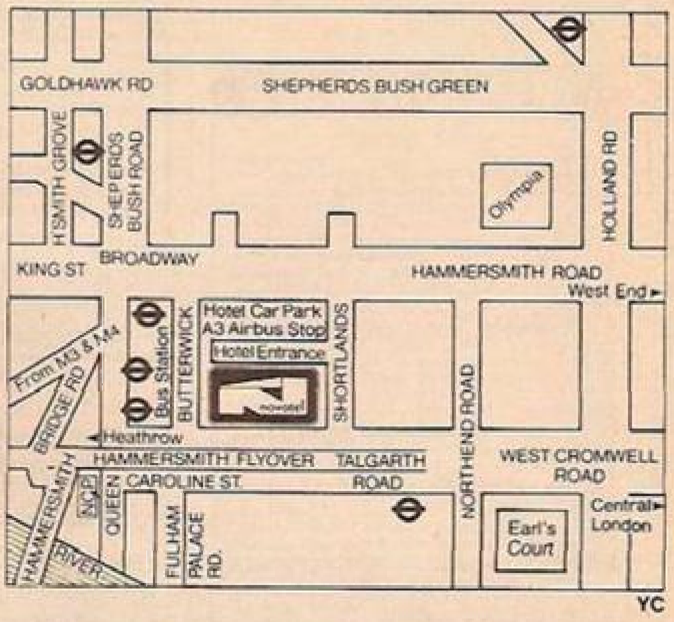
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Local, national and international micro events are updated here. To publicise your event, phone Paul Bond on 01-661 3472.

Amstrad User Exhibition

A lot of people reckon Amstrad is the future, if only because it works. However this may be Amstrads for home and business use will be on display at the Novotel, Hammersmith, from October 5 to October 6. Organised by Nydus Consultants, telephone 0267 681027.

Computer Graphics 85

Restricted to those involved in computer graphics (aren't we all?). The applications-oriented show is at Wembley Conference Centre from 16-18 October. Organised by Online Conferences, telephone 01 868 4466.



Birmingham Children's Hospital staff pharmacist Patrick Ball has written an intravenous feeding software package for the Epson HX-20. Designed to be complementary to the hospital's non-portable Apple system, it guides an experienced prescriber through the standard Parenteral nutrition (look it up) process. (Telephone Bracknell 482923)

Schools Computer Fair

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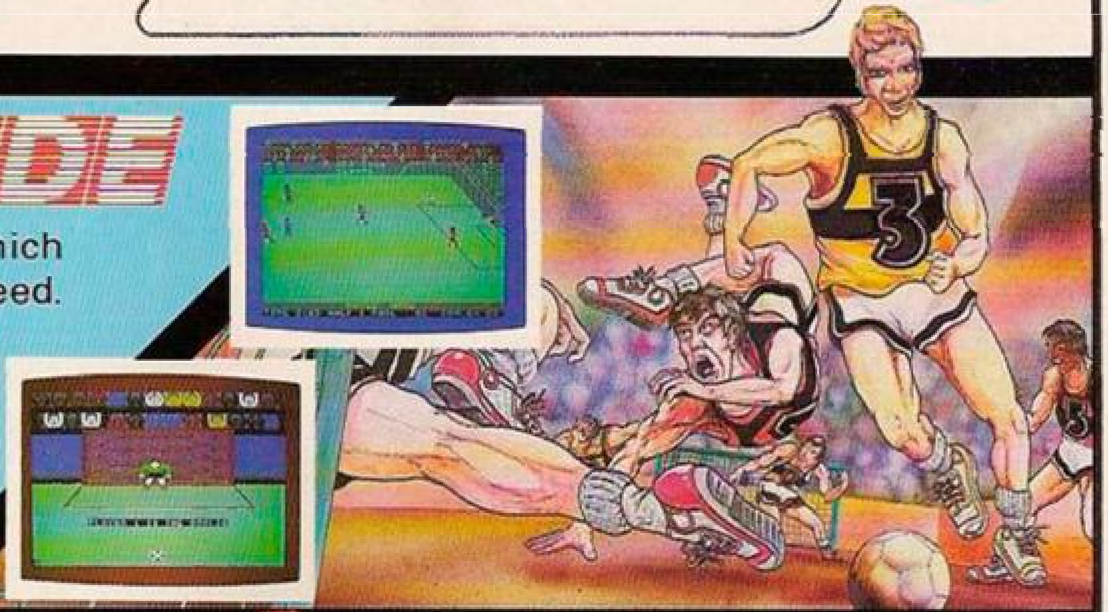
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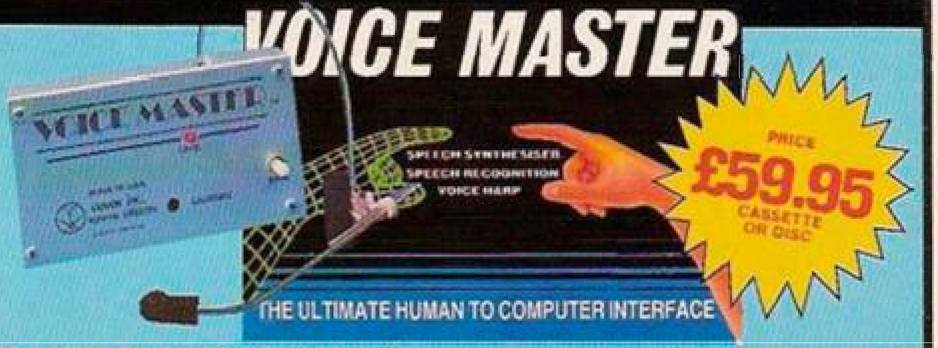
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